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I.G. Farbenindustrie AG during the Second World War

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Expansion in step with

After the German invasion of Poland on September 1, 1939, the

As in the previous annexation phase, I.G. Farben unscrupulously pursued its expansionist policy with successive military operations to establish German rule over continental Europe. It proceeded with a strategically well thought-out system, whereby a working group of the Commercial Committee not only defined the action plans country by country, but also organized them into a continental European framework plan for the control of the production sectors of dyes, light metals, explosives, nitrogen synthesis, inorganic chemicals, organic intermediates, plastics, pharmaceuticals and photography. This "European planning" had matured by the fall of 1940 and in many respects served as a matrix for the post-war plans of the Reich Ministry of Economics, which were intended to underpin the military hegemony that had been achieved economically through capital links, the expansion of the Reichsmark into the reserve currency and a multilateral clearing system. However, these were by no means projections for a distant future. Depending on the thrust of the "blitzkriegs" and the properties and chemical markets within their reach, in which the divisions, sales groups and plant managements involved, together with the experts from the country committees and technical commissions of the Technical Committee, evaluated the situation and drew up scenarios for action on this basis. The employees of the Economic Policy Department then submitted these scenarios to the central and local decision-makers in order to pave the way for their implementation. However, the management committees did not wait for the results of the negotiations but, based on their experience in Austria and in the case of Aussig-Falkenau, simultaneously sent their commercial and technical experts to the newly conquered locations to advise the Wehrmacht's economic commandos on securing the spoils and resuming production, and to initiate the seizure. Thanks to this advance work, their chances of being taken over improved considerably.

This practice was implemented for the first time in Poland.[1] From the beginning of the invasion, Georg von Schnitzler's[2] employees had been lobbying the central authorities in Berlin, offering I.G. Farben's expertise in securing the loot and rebuilding the chemical sector. After the end of hostilities, a flurry of travel began to inspect the most important companies and plants. The Reich Ministry of Economics agreed to the appointment of I.G. Farben commissioners for the chemical company Boruta S.A. in Zgierz and the paint factories in Winnica and Wola. This meant that almost the entire tar dye industry in Poland was in the hands of I.G. Farben, which began to integrate it into the overall framework of its tar dye program in anticipation of the clarification of ownership. In full knowledge of the expropriation of the Polish shareholders, it leased the Boruta Group from the Haupt Treuhandstelle Ost and finally acquired it in 1942 with the support of the Reichskommissariat für die Festigung deutscher Volkstums. She had the paint factory in Wola, which was run by Jewish owners, shut down and took part in its cannibalization. In the case of the paint works in Winnica, on the other hand, it was able to claim that it was a silent partner in the plants built by the Kuhlmann establishments in 1931 via I.G. Chemie Basel with a 50 percent share, and took over the remaining shares after the German occupation of France. In 1942, she also had these plants shut down and transferred them partly to Boruta-Werke and partly to Ludwigshafen. At its instigation, four other small paint factories were closed, so that I.G. Farben controlled the Polish tar dye and intermediate products sector with the exception of a Swiss-owned plant in Pabjanice and managed it from the operating company Teerfarbenwerke Litzmannstadt GmbH.

While I.G. Farben only consolidated its paint division in Poland, it had much more on its agenda after the invasion of Norway that began on April 9, 1940.

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[1] Key documents for the following section: Archive of the Bremen Foundation for Social History (hereinafter SfS Archive), I.G. Farben Process, ADB 55 and 56; supplementary Berthold Puchert: *Fragen der Wirtschaftspolitik des deutschen Faschismus im okkupierten Po- len 1939 bis 1945, mit besonderer Berücksichtigung der IG Farbenindustrie AG.* Habilitation thesis, Humboldt University Berlin (East) 1968.

[2] For Georg von Schnitzler, see the biographical entry at http://www.wollheim-memorial.de/en/georg_von_schnitzler_18841962.

the game.[3] In the first occupation phase, however, the initiative did not lie with her, but with the general director of Junkers Flugzeug- und Motorenwerke AG, Heinrich Koppenberg, who, on behalf of the Ministry of Aviation, planned the generous expansion of Norwegian aluminum capacities and soon called the Reich-owned Vereinigte Aluminium-Werke AG (VAW) onto the scene as a competitor. Meanwhile, I.G. Farben had an important bargaining chip in Norway: Norsk Hydro A/S, in which it had held a technical and capital stake since 1927. After the end of hostilities, Paul Friedrich Häfliger (1886-1950)[4] and the Chairman of the Metal Commission Wilhelm Moschel explored the situation and discovered that there were converging interests beyond the common nitrogen interests: I.G. Farben wanted to build an electron metal factory at the Herøen site and Norsk Hydro intended to enter the aluminum production business by developing domestic alumina deposits.

The prerequisite for this was, of course, the elimination of the dominant influence of French capital groups. With the help of Dresdner Bank, I.G. Farben increased its stake after the conquest of France by acquiring French share packages, and in November 1940, Heinrich Oster (1878-1954)[5] , a nitrogen expert on the I.G. Farben board, joined the board of Norsk Hydro as the successor to a Jewish board member who had been expelled from France. In January 1941, Nordisk Magnesium Elektron A/S was founded, in which I.G. held a 51 percent stake and Norsk Hydro 49 percent. I.G. managers Häfliger and Moschel then involved their CEO Hermann Schmitz[6] in a new round of negotiations to establish the newly founded joint venture, taking into account the additional shares.

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[3] SfS-Archiv, I.G. Farben-Prozess, ADB 65; Fritz Petrick: *Der "Leichtmetallausbau Norwegen" 1940-1945. Eine Studie zur deutschen Expansions- und Okkupationspolitik in Nordeuropa.* Frankfurt am Main/New York: Lang 1992. This study has overtaken the previous assessment of I.G. Farben's Norway policy by Hayes and Milward in important aspects: Alan S. Milward, *The Fascist Economy in Norway.* Oxford: Clarendon 1972, p. 171ff.; Peter Hayes: *Industry and Ideology: IG Farben in the Nazi Era.* Cambridge/New York: Cambridge UP 1987, p. 290ff.

[4] For Paul Friedrich Häfliger, see the biographical entry at http://www.wollheim-memorial.de/en/paul_friedrich_haefliger_18861950.

[5] For Heinrich Oster, see the biographical entry at http://www.wollheim-memorial.de/en/heinrich_oster_18781954.

[6] For Hermann Schmitz, see the biographical entry at http://www.wollheim-memorial.de/en/hermann_schmitz_18811960.

interests of Norsk Hydro into the aluminum plans of Koppenberg and the Ministry of Aviation. They were welcomed with open arms. It was agreed that an alumina processing plant and an aluminum smelter would also be built at the Herøen site. To coordinate the project, Moschel joined the board of Nordische Aluminium AG (Nordag, later renamed Hansa Leichtmetall AG), which had in the meantime been founded by Koppenberg and the Bank der deutschen Luftfahrt, and at the same time took over the general management of the Herøen project, which was now renamed Nordisk Lettmetall A/S. I.G. Farben, Norsk Hydro and Nordag each acquired a third of the share capital. The gigantic investment project, which also included the construction of a new hydroelectric power plant in Mår, was to mobilize 1.15 billion Norwegian kroner.

These transactions were completed by July 1941, and in order to protect the French shareholders and to defend against VAW, which had meanwhile come onto the scene, Norsk Hydro's share capital was increased with the inclusion of the Koppenberg Group and further share packages from French ownership - including considerable expropriated Jewish assets - were purchased. I.G. Farben had established itself in the core area of "light metal expansion in Norway". The construction of the Herøen project began quickly. The first units went into production at the end of 1942, and by 1943, 25,000 tons of alumina had already been mined and

37,000 tons of aluminium and 10,000 tons of magnesium. While I.G. Farben did not commit itself conceptually in the case of Norway until after the practical implementation of its strategic interests in the nitrogen and light metals sector, it took the opposite approach with regard to its Western European neighbors.

Immediately after the Wehrmacht's invasion of the Benelux countries and France, which began on May 9, 1940, the Commercial Committee and the Berlin staff offices drew up detailed country studies on France, the Netherlands, Belgium and England, which they began distributing to the central economic authorities at the beginning of August.[7] Only the England memorandum was not finalized due to the failure of the invasion plans against England and the prospect of the British Commonwealth, which could not yet be overlooked, the preliminary work on the chemical industry in the United Kingdom corresponded in its essential statements to the declarations of intent in the other planning papers. Without going into country-specific details, some key aspects of I.G. Farben's Western European concept can be identified from the extensive documents that have survived.

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[7] SfS Archive, I.G. Farben Process, ADB 51 I, 51 II, 57-62; OMGUS: *Investigations against I.G. Farbenindustrie AG.* Nördlingen: Greno 1986, pp. 228ff., 391ff. ; Peter Hayes: La stratégie industrielle de l'IG Farben en France occupée. In: *Histoire économique et sociale* 3 (1987), pp. 278-285; Hervé Joly: La contribution de l'industrie chimique française à l'effort de guerre

In general, their planning staff called for the chemical capacity of the respective countries to be limited to domestic requirements, as it was regretfully noted that the industrialization process that had been driven forward in these countries since the First World War could no longer be completely reversed. The best way to do this would be to establish a preferential tariff system in favor of Germany and to give German branches and subsidiaries preferential tax treatment. In return, domestic European exports should be restricted in terms of volume and overseas exports should be stopped, except for a quota for the colonial territories to be shared with the Germans.[8] Based on these principles, the future collaboration partners were then to be required to adapt to the hegemonic chemical trust to varying degrees in the various product sectors. For the tar dyes sector, the post-war planners proposed combining the companies into national private monopolies, each of which had to give 50 percent of their share capital to the I.G. The pharmaceutical sector was also to be essentially limited to the national market and subordinated to the "market-regulating" structures of the German pharmaceutical industry. The nitrogen industry was to be subject to control by the nitrogen syndicate and redimensioned in line with the priority of a "Greater German" expansion of capacity. In addition, the I.G. planners had also agreed to accelerate the expansion of the high-tech sectors (plastics, photography and pharmaceuticals).

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allemand. Le cas de Francolor. In: Stefan Martens / Maurice Vaïsse (eds.): *France and Germany at War.* Bonn: Bouvier 2000, pp. 297-315; Alan S. Milward: *The New Order and the French Economy.* Oxford: Clarendon 1970.

[8] These principles were first laid down in the "General Part" of the France Memorandum, see SfS Archive, I.G. Farben Process, ADB 51, Doc. NI-11252.

etc.) and to eliminate the Anglo-Saxon capital groups that are particularly strongly represented there.[9]

With this concept, the I.G. experts found support from their complementary planners in the Reich Ministry of Economics. This enabled them to approach the economic elites of the "European economic area" with a brisk approach. As the case of France shows, the chemical industry tried to gain time by stalling, but the I.G. representatives were largely able to achieve their goals.[10] In November 1940, the I.G. received a share of

51 percent in the French dye industry after conceding the French entrepreneurs a stake of just under one percent in its own share capital. On this basis, the joint venture Francolor S.A. was subsequently founded with a starting capital of 800 million francs.[11] In addition, the I.G. representatives exerted massive pressure to enforce the liquidation of the companies that were not taken over, while the pharmaceutical group Rhône-Poulenc agreed to set up joint sales companies. In this way, the

I.G. Farben to integrate the French chemical industry into the German war economy after it had postponed its dismantling program in favour of "military economic" priorities. However, the strategic turning point of the war and the Resistance soon called this construction into question again. The leading groups of the French resistance movement agreed to annul the treaties enforced by the Germans after liberation.

In contrast to the constellations outlined so far, the military occupation of Yugoslavia and Greece by the Wehrmacht in April 1941 had no significant impact on I.G. Farben's concept of Southeast Europe. The course for subaltern integration into the "greater European economic area" had been set since the Great Depression and, under the pressure of rearmament bottlenecks, the players at I.G. Farben were already made great progress.[12] In 1938, after the annexation of Austria, the Economics Department established a branch office in Vienna and began to underpin the activities of the Southeast Europe Committee to intensify chemical exports and imports of strategic raw materials with special reports and expert opinions. By that year, I.G.'s chemical exports had already reached 35 percent of Germany's total exports to Southeast Europe. Especially in Yugoslavia, Hungary and Bulgaria, I.G. representatives began to steer the process of limited industrialization according to Max Ilgner's guidelines[13] . From the turn of 1941/42, the Board of Management of I.G. Farben finally received several memoranda on the development of the South-East European chemical industry, in which the goal was formulated of securing a dominant position for I.G. Farben based on the South-East European subsidiaries and holdings of Donau Chemie AG and AG Dynamit Nobel Pressburg.[14] A corresponding program was approved by the Board of Management on February 18, 1942. In principle, industrialization was to be coordinated with the estimated fertilizer consumption of south-eastern Europe and combined with an expansion of smelting capacities for chemical raw materials. The specifics of controlled chemical industrial development to be derived from this were defined in special country studies.[15] They contained information on the plants to be planned for processing the chemical raw materials important to I.G. Farben (bauxite, sulphur pyrite, Romanian natural gas, lead-zinc ores, etc.), which were to be removed from the reach of the main competitors, in particular the Solvay Group. The Southeast Europe Committee of I.G. Farben had formed under Ilgner's direction as a coordinating body of leading "divisional technicians" and "merchants".

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[9] Cf. the relevant special sections in the memoranda on the reorganization of the chemical industry in France, the Netherlands, Denmark and Belgium. SfS Archive, I.G. Farben Process, ADB 51, Doc. NI-11252, NI-10164 and NI-11377.

[10] Comprehensively documented in: SfS Archive, I.G. Farben Process, ADB 57-61.

[11] Francolor Agreement of 18.11.1941, NI-6845. SfS Archive, I.G. Farbenprozess, ADB 58.

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[12] Cf. on the following BArchB, R 8128, No. A 228, A 918, A 1758; Hans Radandt: Die IG Farbenindustrie AG und Südosteuropa 1938 bis zum Ende des zweiten Weltkrieges. In: *Jahr- buch für Wirtschaftsgeschichte* 1967, Part I, pp. 77-146; Hayes: Industry and Ideology, pp. 297ff.

[13] For Max Ilgner, see the biographical entry at http://www.wollheim-memorial.de/en/max_ilgner_18991966.

[14] Cf. above all Kleemann's and Reithinger's letter to the board of I.G. Farben dated February 12, 1942 with undated enclosure: Documents for a statement by I.G. on the question of the development of the chemical industry in southeastern Europe. SfS Archive, Nuremberg Documents, Doc. Parts I and III of this memorandum are also printed in Radandt: IG Farbenindustrie AG and Southeast Europe, pp. 128-146.

[15] Hans Radandt: Reports of the Economics Department of IG Farbenindustrie AG on Southeast Europe. In: *Yearbook of Economic History* 1966, Part IV, pp. 289-314.

which systematically promoted the Group's expansion into the Danube and Balkan countries.

Another focus of expansion was the Soviet Union.[16] Immediately after the beginning of the war of annihilation on June 22, 1941, I.G. Farben experts were requested by the Wehrmacht's economic staff to restore important basic chemical sites. One such "patenbe- trieb" was Eesti Fosforit AG, which, as the experts from I.G. Bitterfeld knew, had been exploiting a large phosphate deposit near Reval since 1938. In order to increase production, I.G. took over the company and the plant in 1942 as part of a trust agreement. At the same time, the I.G. Executive Board had overviews of the holdings of the predecessor companies from before 1914 drawn up in order to prepare for the corresponding restitution claims, and Otto Ambros (1901-1990)[17] asked Carl Krauch (1887-1968)[18] on June 28, 1941 for permission to evaluate the chemical industry in the Soviet Union with a group of experts. The main focus was on the Soviet synthetic rubber factories, which synthesized rubber from ethanol using the so-called Lebedev process. Ambros issued the first circular of the "Buna Commission Russia" on July 1, 1941.

Ambros, however, had rushed ahead of the military events too euphorically and the commission initially had to limit itself to improving its knowledge of the sites and assembling the management for the takeover. In addition, it became increasingly urgent to prevent the plants from being taken over by third parties or transferred to Reich ownership. The

I.G. therefore decided to clothe its takeover intentions in the form of an "East German company" and in December 1941 presented the Reich Ministry of Economics with a draft contract for the foundation of a synthesis company.

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[16] SfS Archive, I.G. Farben trial, ADB 63 and 64; Roswitha Czollek: Estnische Phosphate im Griff der IG Farbenindustrie AG. In: *Jahrbuch für Wirtschaftsgeschichte* 1966, Part IV, pp. 201- 214; Karl Heinz Roth: Justitiar der Räuber. Wolfgang Heintzeler and the plans of I.G. Farbenindustrie AG to plunder the Soviet rubber factories in 1941/42. In: *1999. Zeit- schrift für Sozialgeschichte des 20. und 21. Jahrhunderts* 3 (1988), H. 2, pp. 96-131.

[17] For Otto Ambros, see the biographical entry at http://www.wollheim-memorial.de/en/otto_ambros_19011990.

[18] For Carl Krauch, see the biographical entry at http://www.wollheim-memorial.de/en/carl_krauch_18871968.

schuk Ost GmbH, which was the subject of intensive negotiations after the resumption of the German offensive in the summer of 1942. I.G. pulled out all the stops in order to secure exclusive control of the Soviet synthesis process, in contrast to its investment in Soda- und Ätzkalien Ost GmbH and other Eastern companies. But no rubber factory came within the reach of its advance units, and I.G. subsequently had to limit itself to exhorting the leaders of the Nazi dictatorship to proceed more wisely in the "Eastern War" and to exploit the ethnic contrasts of the multi-ethnic state to "de-Bolshevize and de-Russianize the Eastern region".[19]

Arms expansion and war profits

The expansion of the I.G. Farbenindustrie AG archipelago from the "Greater German" core zone into the "Greater European Economic Area" was accompanied by a vast expansion of armaments capacities that even the central players were barely able to keep track of. In addition, there were completely new fields of destruction technology in which the chemical trust intervened in order to bring them under control and to sound out their "dual" usability for the post-war perspective. Together with the already established segments, they were coordinated by commissions that controlled the respective development and processing stages across divisions and once again significantly changed the Group structure. The heads of these development and production groups rose to become powerful functionaries who easily pushed through their projects within the established decision-making structures of the Group management. They included Otto Ambros (rubber and chemical weapons), Ernst Bürgin[20] (light metal and metal chemistry), Heinrich Bütefisch[21] (fuels and lubricants), Paul Müller (Chairman of the DAG Management Board and Head of the Explosives Group) and

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[19] Richard Riedl: The Russian Question. Gedanken zur Neugestaltung Osteuropas, Vienna, March 1943. BArchB, R 43 II, No. 693 b.

[20] To Ernst Bürgin see the biographical entry at http://www.wollheim-memorial.de/en/ernst_buergin_18851966.

[21] To Heinrich Buetefisch see the biographical entry at http://www.wollheim-memorial.de/en/heinrich_buetefisch_18941969.

Fritz Gajewski[22] (synthetic fibers), to name just the most important. The dominant position of this group of armaments technocrats and the further expansion of acetylene and high-pressure chemistry driven by them meant that the gap to the technological development lines of the major international competitors of the I.G. Farben Group widened even further. In addition, the extreme wartime focus on the production of basic materials and military demand cut the company off from the mass production of consumer goods in the synthetic fibers and plastics sector, which had been heralding the breakthrough into the chemical age in the western hemisphere since 1939/40.

The militarized basic materials divisions of I.G. Farben were opposed on the government side by the I.G. Farben managers' group headed by Carl Krauch, which was responsible for the allocation of workers, construction materials (iron and steel, cement, etc.), electrical energy, machinery and process engineering equipment in these central functional areas of armaments. In his capacity as General Plenipotentiary for Special Questions of Chemical Production (GBChem), Krauch had the authority to enforce the urgency levels for the allocation of the increasingly scarce manpower and construction quotas, and he had the necessary framework data drawn up by the Reich Office for Economic Expansion, which had been upgraded to the Reich Office in December 1939 and of which Göring had appointed him head in the meantime. After the death of Carl Bosch[23] in 1940, he also took over as Chairman of the Supervisory Board of I.G. Farben.

Even during the transition to the strategic defensive, Krauch remained one of the most important armaments technocrats of the Nazi dictatorship, who knew how to enforce the accumulation interests of the chemical trust, which were always represented in a dual function, and the expansion of the military-economic basic materials sector, also within the framework of the "central planning" of the Ministry of Armaments. In this way, the armaments sectors of I.G. Farben, with the exception of iron and steel production, controlled the basic materials basis of German warfare and at the same time formed the

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[22] To Fritz Gajewski see the biographical entry at http://www.wollheim-memorial.de/en/friedrich_fritz_gajewski_18851965.

[23] To Carl Bosch see the biographical entry at http://www.wollheim-memorial.de/en/carl_bosch_18741940.

most dynamic factor in their military research and development programs. It is therefore not surprising that in 1940/41, in the frenzy of the technological and operational superiority of German warfare, Krauch claimed control over the entire scientific potential of the Nazi dictatorship.[24] But he reached his limits, and even in some new segments of superweapons development, the I.G. Farben Group was unable to appropriate the new knowledge potential that emerged. In this overview, we can only highlight the most important lines of development of the war potential mobilized by I.G. Farben.

In contrast to the other armaments segments, the explosives group underwent the sudden expansion surge at the beginning of the war that had been in preparation since 1934/35.[25] It took over the technical management of 26 factories of the Reich-owned Montan Industrie GmbH. In addition, DAG converted several fertilizer and explosives plants that it had bought up in 1938 in order to expand its capacities in the area of newer developments (hexogen, plastic explosives) under its own management. 800,000 of the explosives produced by the Germans during the Second World War

900,000 tons of explosives came from the plants and leased facilities of the I.G. Farben explosives group. The annual profits of DAG, the control center of the explosives group, rose from 16.1 million RM in 1939 to 49.8 million RM in 1943 and during this period it became the largest holding company of the I.G. Farben Group, ultimately generating 59.1 percent of the total turnover of the I.G. holdings. But that was only the tip of the iceberg. The basic material suppliers of the explosives group for glycol and diglycol, toluene and stabilizers were spread across all divisions and operating companies.

However, I.G. Farben was also involved in a project to develop a new "super explosive", which was to be produced by a "uranium machine". The initiative for this project to develop the atomic bomb, which was primarily in the field of nuclear physics, did not come from I.G. Farben.

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[24] Maier, Helmut Maier: *Research as a weapon. Armaments research in the Kaiser Wilhelm Society and the Kaiser Wilhelm Institute for Metals Research 1900-1945/48.* Göttingen: Wallstein 2007, vol. 2, pp. 724ff.

[25] SfS Archive, I.G. Farben Process, ADB 33 and 34; Gottfried Plumpe: *Die I.G. Farbenindustrie AG. Economy, Technology and Politics 1904-1945,* Berlin: Duncker & Humblot 1990, p. 658ff.

the war. However, the company made every effort to penetrate the "Uranium Association" network, which had been coordinated by the Army Weapons Office since the beginning of the war, in order to gain control of at least some areas of it.[26] The supply of heavy water (deuterium oxide), which was needed to slow down the neutrons in the test facility for the construction of a natural uranium reactor, was an obvious entry point. An existing plant at Norsk Hydro for the electrolytic production of heavy water was expanded to an annual capacity of one ton immediately after the occupation, and construction of a second plant using a catalytic process also began in 1941. In 1942, Bütefisch also offered to build a catalytic conversion plant in Leuna, the costs of which I.G. Farben was to bear itself on condition that it was given access to the entire nuclear project and was granted a share in the patent rights. The Reichsforschungsrat, which had meanwhile taken over the coordination of nuclear weapons research, agreed and construction of the facility began. As a result, the alternative development of isotope separation processes for uranium enrichment and the use of normal water as a braking substance in the future reactor was restricted.

But I.G. was not in a position to provide the necessary heavy water in sufficient quantities for the development line it favored: Norsk Hydro's electrolysis plant in Vermork was destroyed by a sabotage squad at the end of February 1943. A year later, the ferry that was transporting the remaining heavy water supplies for enrichment of the experimental plant in Leuna was also sunk. I.G. Farben took advantage of this bottleneck situation to develop a new fuel developed by its own physicists.

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[26] SfS Archive, microfilm collection, Irving collection on German nuclear weapons research, no. 1-4; Mark Walker: *Die Uranmaschine. Myth and Reality of the German Atomic Bomb*. Berlin; Siedler 1990; Ders.: Eine Waffenschmiede? Nuclear weapons and reactor research at the Kaiser Wilhelm Institute for Physics. In: Helmut Maier (ed.): *Joint research, authorized representatives and the transfer of knowledge. The role of the Kaiser Wilhelm Society in the system of war-relevant research under National Socialism.* Göttingen: Wallstein 2007, pp. 352-394; Joachim Radkau: *Aufstieg und Krise der deutschen Atomwirtschaft 1945-1975. Verdrängte Alternativen in der Kerntechnik und der Ursprung der nuklearen Kontroverse.* Reinbek bei Hamburg: Rowohlt 1983; Walther Bothe / Siegfried Flügge (eds.): *Kernphysik und kosmische Strahlen* (Naturforschung und Medizin in Deutschland 1939-1946, vol. 14). Weinheim: Verlag Chemie 1948.

concentration process.[27] In return for the construction of a large-scale plant, it attempted to patent all the processes developed to date for the development of heavy water in order to prevent the nuclear physicists involved from filing their own patent applications after the end of the war. This led to serious disputes, especially as I.G. Farben also demanded an extremely inflated price for the deuterium oxide, and the contract awarded to them to build the concentration plant was ultimately limited to the final stage due to a decision by the authorized representative for nuclear physics, Walther Gerlach. I.G. Farben had overreached and was distanced again.[28] The integration of its explosives division into the development of the atomic bomb had failed, and in addition it had helped to advance a line of development that had rejected the competing American "Manhattan Project".

In contrast, I.G. Farben was able to celebrate macabre triumphs in the field of chemical weapons development, which it had increasingly dominated since the Four-Year Plan period.[29] In the first days of the war, the Reich Office for Economic Expansion submitted an "expansion plan" to the Army High Command for the offensive C-weapons war, the core of which, the establishment of a production capacity for a maximum of 19,000 tons of D-Lost, outweighed the competition from the Army Weapons Office and its medium-size industrial cooperation partners. While production was starting up at the Ludwigshafen, Wolfen and Hüls plants, the I.G. management decided on 7 September 1939, following a meeting at the Army Weapons Office, to found an operating company for its C-weapons sector, which was also to take charge of the construction of a new plant for the nerve agent Tabun, designed for 1,000 tons per month, and a production center for the modernized first-generation C-weapons in Gendorf, which was initially to be built in con- struction.

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[27] Walker: Uranium machine, p. 170ff.

[28] Walker: Uranium machine, p. 174ff.

[29] The most important key documents for the following subsection: BArchB, R 3, No. 1894; SfS Archive, I.G. Farben trial, ADB 13, 35 and 36; supplementary Angelika Ebbinghaus: Chemi- sche Kampfstoffe in der deutschen Rüstungs- und Kriegswirtschaft. In: Dietrich Eichholtz (ed.): *Krieg und Wirtschaft. Studien zur deutschen Wirtschaftsgeschichte 1939-1945*. Berlin: Metropol 1999, pp. 171-194; Florian Schmaltz: *Kampfstoff-Forschung im Nationalsozialismus. On the cooperation between Kaiser Wilhelm Institutes, the military and industry.* Göttingen: Wallstein 2005, pp. 159ff., 446ff.; Olaf Groehler: *Der lautlose Tod.* Berlin (East): Verlag der Nation 1978; Gerhard Schrader: *Die Entwicklung neuer insektizider Phosphorsäure-Ester.* Weinheim: Verlag Chemie 1963.

text of Orgacid GmbH had been planned. Anorgana GmbH was founded with its headquarters in Ludwigshafen, its managing director was Ambros and Fritz ter Meer (1884-1967)[30] and August von Knieriem (1887-1978)[31] joined the supervisory board. Anorgana GmbH then had the fixed assets of the Gendorf plant transferred to it as part of a management and lease agreement. In December 1939, Dyhernfurth near Breslau was chosen as the location of the Tabun factory. After the Wehrmacht had agreed to assume the financing and the risk, Anorgana GmbH founded its own construction company for the construction of Dyhernfurth, Luranil Bau- gesellschaft mbH, at the end of January 1940, which also took over all construction projects of Orgacid GmbH at the end of 1941. In the meantime, tabun had also been integrated into the C-weapons planning, which envisaged the production of 7,600 tons of D-lost, 5,000 tons of nitrogen-lost, 600 tons of diphosgene and 1,000 tons of tabun per month by mid-1941. As in the explosives sector, I.G. Farben had finally established itself as a de facto monopolist in the field of C-weapons.

In the following years of the war, the production figures for the various chemical weapons were frequently modified due to constantly changing operational plans. This was only possible because Anorgana boss Ambros systematically pushed ahead with the expansion of the capacity of the I.G. plants. In close cooperation with the explosives experts, he reduced all warfare agents that contained bottleneck products of explosives chemistry and integrated their production cycles into the chemical trust's basic materials network. Since the turn of the year 1941/42, nine C-weapons plants had existed or were nearing completion in the "Greater German" core zone and their backbone was formed by the plants and facilities managed by Anorgana GmbH in Gendorf-Trostberg (D-Lost), Hüls (D-Lost), Ludwigshafen (phosgene and diphosgene) and Dyhernfurth (tabun). By mid-1941, a total of 32,000 tons of C-weapons had accumulated, about a third of which was filled into bombs and shells. If it had been used, I.G. Farben would have been able to ramp up production at any time due to its integration into the integrated production of basic materials. This ex-

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[30] To Fritz ter Sea see the biographical entry at http://www.wollheim-memorial.de/en/fritz_friedrich_hermann_ter_meer_18841967.

[31] For August von Knieriem, see the biographical entry at http://www.wollheim-memorial.de/en/august_von_knieriem_18871978.

This constellation did not change even after the founding of the Ministry of Munitions and Armaments in 1942. When a "Special Committee K" was established as a new steering body in the Ministry of Munitions' Armaments Supply Office, Krauch appointed Ambros as its head, and Wolfen, Hoechst, Mainkur and Uerdingen were added to the I.G. plants involved in the production of supplies.

I.G. Farben placed the main emphasis on the expansion of the new development and production lines for the chemical weapons of mass destruction. By the time the first construction phase of Dyhernfurth was completed at the end of 1942, it had invoiced the Reich's Montan GmbH for 71.1 million RM. In September of that year, I.G. delivered 138 tons of tabun to the Wehrmacht for the first time, and by May 1943, 1,500 tons had been delivered to the arsenals. At the same time, in the summer of 1942, laboratory testing of the second nerve agent sarin, synthesized by Schrader, was completed in Elberfeld. Just under a year later, production also seemed technically feasible.

But Ambros was not quick enough with this expansion of capacity. On May 15, 1943, at a meeting at the Führer's headquarters, he pointed out the high C-weapon potential of the Allies, who had a much broader ethylene base for first-generation warfare agents and were possibly also working on the development of nerve agents. As a result, he achieved the classification of his program in the highest urgency level: The D-Lost plant in Gendorf was to be completed more quickly and the monthly output of Dyhernfurth was to be increased to 2,000 tons. In addition, it was decided to build a test plant for the production of sarin with a monthly capacity of 100 tons in Dyhernfurth and a second plant in Falkenhagen west of the Oder, which was designed for a monthly capacity of 500 tons. Ambros and Krauch stuck to this plan until the final months of the war, despite the increasing difficulties. In contrast to the uranium project, I.G. Farben had succeeded in providing the Nazi leadership with an instrument for mass destruction in the form of the modernized "conventional" and the new C-weapons, which they could use, in the words of Ambros, "as a means of last resort". In fact, 12,000 tons of Tabun had been filled into bombs and grenades by the end of the war. However, as the Allies' strategic air war from May 1944 onwards

German fuel and aircraft industry, the logistical prerequisite for the "very last decision" made available by I.G. Farben no longer applied.[32]

From the beginning of the war, the production of synthetic fibers and plastics also focused almost exclusively on the needs of warfare, while I.G. Farben maintained its involvement in the field of first-generation textile substitutes.[33] As the needs of the armaments authorities in this area were relatively limited, I.G. Farben fell behind its international competitors, such as in the emerging petrochemicals sector, which the US Du Pont conglomerate in particular increased from 1939 by penetrating the end consumer level with its new developments and gaining access to civilian mass consumption. Shortly before the start of the war, I.G. Farben became a licensee of the polyamide 6 (nylon) developed by Du Pont, while polymerizing and con- densing the polyamide fibre Igamid B (later trade name: Perlon), which was comparable to nylon, via a different route via the precursor caprolactam, to which the polyurethane known as Igamid C was finally added.

In 1941, I.G. Farben began licensed production of nylon (under the I.G. designation Igamid A) as well as in-house production of Igamid B and Igamid C. Production sites for the parachute silk and nylon wires supplied to the Luftwaffe were initially Ludwigshafen, Leverkusen and Wolfen. Further plants were built in Lichtenberg and Premitz, and the new I.G. plant in Landsberg an der Warthe in annexed western Poland, originally planned as a film factory, also began producing Perlon fibers and Perlon silk in 1942. The annual capacity for polyamide products eventually amounted to 8,200 tons and almost exclusively satisfied the needs of the Wehrmacht.

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[32] Otto Ambros: The situation in the war material area. Excerpt from the lecture at the Führer's headquarters on May 15, 1943 with a comparison of the situation in March 1944, March 20, 1944. BArchB, R 3, No. 1894, Bl. 34.

[33] For the following, see Walter Reppe: Auswirkungen der Acetylen- und Kohlenoxyd-Chemie der Badischen Anilin- & Soda-Fabrik Ludwigshafen a. Rh., auf das Gebiet der Kunststoffe. In: *Kunststoffe* 40 (1950), H. 1, pp. 1-12; Ders.: *Chemie und Technik der Acetylen-Druck-Reaktionen.* Weinheim: Verlag Chemie 1951; Plumpe: I.G. Farbenindustrie AG, p. 315ff.

This also applied to the new generation of plastics, which were largely based on the same precursors. Military demand for the by-products of acetylene chemistry based on catalytic high-pressure synthesis also grew only slowly. It was just enough to finance the rapid succession of developments (polyvinyl chloride, polyvinyl acetate, polystyrene, polyurethane) and the new products of so-called Reppe chemistry obtained from the catalytic incorporation of acetylene into various other organic substance classes. Nevertheless, the share of fully synthetic plastics in I.G. Farben's plastics business had risen sharply since 1938/39 and by 1943 had reached 66 percent of sales, which had risen from RM 28.3 million (1939) to RM 122.6 million. During this period, the return on sales increased to over 20 percent. In order to maintain these high extra profits for as long as possible, I.G. Farben was slow to adjust its capacities to the gradually growing demand from the electrical engineering industry as well as the aircraft and motor vehicle construction sectors. In addition, it kept the official demand monopolists out of the core zone of the post-war boom, which was emerging primarily in the USA, by blocking their interests in Perlon, nylon and plastics technology. The research projects of the plastics laboratories were arcane areas with the help of which I.G. Farben tried to keep the gap to its international competitors from becoming too large despite the lack of mass sales.

Such parallel considerations in the direction of a "dual" re-conversion of the development and production lines played no role in the light metals sector. From the beginning of the war, it expanded just as massively as the explosives and chemical weapons sector and, starting from the technological center of Bitterfeld and Aken, established a European north-south axis that stretched from Moosbierbaum in Austria to Herøen in Norway and increasingly spread to the metallurgy of non-ferrous metals.[34] Sales at I.G. Farben's aluminum and magnesium smelters rose continuously between 1939 and 1943 by around 13 percent annually from RM 152.5 million to RM 240.9 million. In contrast, annual investment expenditure fluctuated around the relatively low average margin of RM 20 million per year, with the exception of 1941. Although the production facilities, which reached an asset value of around RM 125 million by 1943, were depreciated at a rapid pace, profits tripled between 1939 and 1943 from RM 6.4 million to RM 18.7 million.

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[34] SfS Archive, I.G. Farben Process, ADB 30, 39, 40 and 41; Dirk Hackenholz: *Die elektrochemischen Werke in Bitterfeld 1914-1945. Ein Standort der IG-Farbenindustrie AG.* Münster: LIT 2004, p. 288ff.; on the technical processes for processing non-ferrous metals, see also W. E. Kaiser: The non-ferrous heavy metals. In: Karl Winnacker / Ernst Weingartner (eds.): *Che- mische Technologie. Vol. 5, Metallurgy (Alleghenies).* Munich: Hanser 1954, pp. 253-378, here pp. 287-298.

At the same time, I.G. Farben expanded its involvement in the processing of important non-ferrous metals, which were required for the production of high-quality steel alloys. From the beginning of the war, it increasingly purchased non-ferrous metals from its associated company Duisburger Kupferhütte, and in 1939 it also built an electrolysis plant for nickel extraction in Frose in the northern Harz region, which supplemented a plant that had long existed in Oppau and was operated using an I.G. proprietary high-pressure process. In 1940, together with Metallgesellschaft and the Krupp Group, it also founded a consortium to exploit the nickel deposits in Petsamo in northern Finland, which had become accessible to the Germans in the meantime and belonged to the British-Canadian International Nickel Company. The Finnish operating company was granted a ten million loan to build a new extraction plant and a plant to process the nickel ore into nickel matte, which was then transported to Germany. Petsamo was only the most important example of the extraordinary diversification of I.G. Farben in the field of metal chemistry since the beginning of the war. It was an indispensable expert and mediator for the armaments authorities, facilitating their access to the production capacities of I.G. Farben's international business partners under enemy administration.

However, I.G. Farben made its most significant contribution to the German armaments industry in the field of synthetic rubber. In the summer of 1940, after the "blitzkriegs" against Northern and Western Europe, it abandoned the restraint it had exercised up to that point and set the course for a huge expansion in capacity. This turnaround was primarily due to the fact that the company management now expected a rapid and victorious end to the war. As a result, large capacities would soon be needed in order to become the world market leader with the now competitive synthetic rubber on the one hand, and to meet the ever-increasing demand from strategically important customers on the other.

to be able to satisfy the need to further arm the Wehrmacht. All decisions were based on this "dual" perspective, and I.G. Farben's officially established mandate holders once again ensured that the innovation, location and investment policy determinations of their manager colleagues from the Rubber Commission and the Group management were accepted by the planning centers of the armaments industry expansion.

In August 1940, the second Buna factory in Hüls, coupled with the exhaust gases from the Scholven hydrogenation plant, was started up.[35] Although enormous problems had arisen during construction with regard to the procurement of labor, construction materials and technical personnel, serious planning now began for the design of a third and fourth plant. The rubber commission experts went their own way. They rejected a site in Rattwitz near Breslau, which had been imposed on them by the armaments and regional planning authorities, although excavation work had already begun at the turn of 1939/40, and in the autumn of 1940 they pushed through Ludwigshafen as the third site, which was designed for an annual capacity of 30,000 tons. The rubber experts at I.G. Farben, on the other hand, were prepared to build the fourth production facility in the annexed eastern territories due to the location of Buna III, which was at risk from the air war. After intensive inspection trips, they decided in November 1940 on a site in Monowitz in annexed eastern Upper Silesia that seemed ideal, whereby the possible access to the prisoners of the nearby Auschwitz concentration camp also played a role. At the same time, Buna IV was to be linked to a plant for the production of the aircraft fuel isooctane, which the I.G. leadership had also just promised as part of the fuel program.

Another important fundamental decision was made in the area of process technology. The Rubber Commission agreed that the Ludwigshafen plant should be built on the basis of a now technically mature three-step process.

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[35] SfS Archive, I.G. Farben Process, ADB 29; Peter John Turnbull Morris: *The Development of Acetylene Chemistry and Synthetic Rubber by I.G. Farbenindustrie Aktiengesellschaft: 1926- 1945.* dissertation, University of Oxford 1982, p. 321ff.; Ders.: Ambros, Reppe, and the Emergence of the Organic Chemicals in Germany 1925-1945. In: Anthony S. Travis (ed.): *Determinants in the Evolution of the European Chemical Industry, 1900-1939: New Technolo- gies, Political Frameworks, Markets, and Companies.* Dordrecht: Kluwer 1998, pp. 89-122; Bernhard Lorentz / Paul Erker: *Chemie und Politik. The history of Chemische Werke Hüls. A study on the problem of corporate governance.* Munich: Beck 2003.

stage process developed by the Ludwigshafen chemist Walter Reppe.[36] This process required considerably less energy because it used only a third of the amount of acetylene previously required for the conversions and was also directly integrated into the compound technology of high-pressure chemistry via methanol synthesis. Construction of the Ludwigshafen plant began at the end of 1940. Buna production in Monowitz, on the other hand, was initially to be based on the four-stage process and later coupled with the three-stage process. The existing plants in Schkopau and Hüls were also to be converted to this mixing process in order to significantly reduce production costs.

In order to secure its supply monopoly from a business perspective, I.G. Farben raised the funds required for the investments largely from its equity and the rapidly rising profits of the Schkopau and Hüls plants, as the guaranteed price averaged RM 2,500 per tonne, while natural rubber cost around RM 800; in addition, there were a total of RM 281.1 million in Reich loans for construction financing, of which I.G. Farben only repaid a small part by the end of the war. Despite ongoing rationalization-related price reductions, the profit margins were so high that I.G. Farben was able to cover its gigantic investment expenditure in the Buna sector of around RM 1 billion almost entirely from the proceeds by the end of the war and was also able to accelerate depreciation. Although the course of the war made the targeted access to the mass consumption of the world markets illusory, the negative balance in this area amounted to only one to two million RM in 1944. This was offset by the enormous and multifunctional production capacities of Verbundchemie, in which I.G. Farben had invested around 24 percent of its total investment of around RM 3.9 billion between 1936 and 1944.

The prerequisite for this profit calculation was the unconditional expansion of the plants, which from 1940/41 was only possible by accessing unfree workers and concentration camp prisoners. In 1939, Schkopau and a small experimental plant in

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[36] As in the four-stage process, the starting point was acetylene, which was converted with formaldehyde, a by-product of methanol synthesis, in a catalytic high-pressure process via butynediol to 1,4-butylene glycol, dehydrated to butadiene and then polymerized.

Leverkusen made 22,400 tons of Buna available to the war economy. In 1940, including the first deliveries from Hüls, the figure was 40,900 tons and 70,600 tons in 1941. In 1942, the Ludwigshafen plant joined the overall production, which was increased to 100,500 tons, for the first time with a starting margin of 200 tons, and in 1943, at 118,700 tons, the capacity requirements of the Reich Office for Economic Expansion were just reached, resulting in record sales of 283.8 million RM. At the same time, the share of natural rubber in total consumption fell steadily. In 1944, it amounted to only two percent. I.G. Farben's corporate strategists had been wrong in their assumptions on which their expansion option was based, but from a business perspective, their calculations had worked out perfectly.

In contrast, the fuel and mineral oil sector had already reached its boom phase in the pre-war years.[37] In addition to the twelve hydrogenation plants already in existence, two further plants were added, which the Ludwigshafen plant constructors planned and built as before and then handed over to their group's fuel group: A synthesis plant in Heydebreck, Upper Silesia, and a hydrogenation plant integrated into the Moosbierbaum complex of Donau Chemie AG. In addition, the I.G. Farben fuel group was responsible for the wartime expansion of the plants in Brüx and Blechhammer and converted the large plant in Pölitz, operated jointly with Standard Oil and Royal Dutch Shell, from refinery residues to coal. In addition, I.G. Farben was involved in the conversion of the Böhlen and Gelsenberg hydrogenation plants, and most recently in Pölitz, to aviation fuel and coordinated the ongoing expansion of the new plants that were started up shortly before the start of the war. Their overall commitment therefore increased considerably once again, and their own synthesis plants supplied the main bulk of the fuel and mineral oil supplies to the three parts of the troops from 1941/42 onwards. Added to this was the expansion of the special plants for the aviation fuel additive lead tetraethyl and for high-viscosity lubricants, which were derived from a modified process for methanol synthesis and supplied to the Luftwaffe primarily by the I.G. plant in Oppau as "Oppanols". The result was a rise

The increase in sales in the entire mineral oil synthesis sector from RM 162.3 million in 1939 to more than double that figure, namely RM 351.5 million, in 1943, which was offset by an increase in profits from RM 23.4 million to RM 40.8 million despite the accelerated depreciation of the plants. In the same period, fuel sales (petrol, aviation fuel and diesel oil) rose from RM 393.17 million to RM 544.43 million, with the proportion of aviation fuel and diesel oil steadily increasing at the expense of standard fuels.

In contrast, there were qualitatively significant changes in the high-tech field of fuel synthesis. Until then, the I.G. leadership had resisted the Luftwaffe's efforts to establish a production capacity for the high-performance gasoline isooctane that would meet its requirements. The production of isooctane by splitting the butyl alcohol produced during the modified methanol synthesis into isobutylene was extremely uneconomical compared to the direct polymerization of isobutylene, which could be distilled from the cracked gases of oil refineries. As long as the plants built since 1935 to produce the lead-tetraethyl-enriched substitute fuel from hard coal hydrogenation were not amortized, the armaments planners of the Ministry of Aviation were unable to persuade the top managers of the I.G. Farben fuel group, who were covered by their official representatives, to change their minds. This changed in the fall of 1940, not only because of the now exploding profits and the associated forced depreciation possibilities, but also due to the strategic change of course of I.G. Farben's top management, which had been convinced since the summer of 1940 of the imminent victorious end of the European "blitzkriegs" and was now interested in the fastest possible and highest-quality strategic rearmament of the Luftwaffe due to its own global post-war planning. The course of the German air offensive against England in August and September 1940 clearly demonstrated that the availability of isooctane played a decisive role in this. For this reason, the company management now added additional strategic parameters to its calculations and declared its willingness to invest in the Heydebreck and Moosbierbaum hydrogenation plants as well as in the German Luftwaffe.

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37 Cf. on the following Plumpe: I.G. Farbenindustrie AG, p. 290ff.; Wolfgang Birkenfeld: *Der synthetische Treibstoff 1933-1945. Ein Beitrag zur nationalsozialistischen Wirtschafts- und*

and to integrate facilities for modified methanol synthesis and subsequent isooctane production into the fourth Buna plant planned in Upper Silesia. This coordination of geostrategic interests - too late for the course of the war from a German perspective - was, of course, generously rewarded by I.G. Farben. During the war years, it invested around RM 500 million in aviation fuel plants, high-quality lubricating oils and lead tetraethyl, with 80 percent of the aviation fuel sector being financed by the Luftwaffe.[38]

The extent of the armaments efforts with which I.G. Farben contributed to the European and ultimately global "Great War" was enormous. But it also profited from the national economy in areas that were not directly "important to the war effort", such as pharmaceuticals, insecticides, textile substitutes and synthetic detergents.[39] Between 1939 and 1943, the chemical trust's total turnover expanded from RM 2 billion to around RM 3.2 billion. Including the associated companies and other income, profits were drawn from these, which rose from RM 274.9 million to RM 400.1 million between 1929 and 1941 and leveled off at RM 325.8 million and RM 322.7 million in 1942 and 1943 respectively. After deducting taxes and extremely excessive depreciation, the profit share of gross profit was well over 20 percent by the 1941 financial year and stabilized at 15 percent in the following years of the war. These enormous profits were only distributed at an average of 27.2 percent during the war years. They were increasingly invested as hidden reserves, and this was reflected in an annual increase of 8.5 percent in total assets and an increase in equity capital from around RM 1 billion in 1939 to RM 1.8 billion in 1943. The profits generated by I.G. Farben in the phase of accelerated rearmament and during the war years were significantly higher than those of the Weimar stabilization years.

Armaments policy. Göttingen: Musterschmidt 1964, pp. 143ff., 160ff.

[38] For more details see Plumpe: I.G. Farbenindustrie AG, p. 289ff.

[39] For the following, see SfS Archive, I.G. Farben Process, ADB 37; Plumpe: I.G. Farbenindustrie AG, pp. 547, 557, 612, 614, 665, 672ff., 683ff.

New perspectives on "World renown"

Since the German triumph over France, I.G. Farben, through the working groups of the Commercial Committee and the headquarters in Berlin NW 7, not only pursued its company's access to the continental European chemical industry, but also combined its plans with far-reaching concepts for the forcible restoration of the "world standing" that its predecessors had enjoyed before the First World War. For example, when drafting a memorandum on the introduction of a "Europa-Patents", the centralization and rationalization of the patent system under German control was primarily intended to increase the "overall thrust" of the "European economic area" vis-à-vis the other economic blocs of the world.[40] On 3 August 1940, the senior managers of the Commercial Committee also declared in a letter accompanying the France programme that the self-sufficiency to be ensured by chemical planning and the rational use of the production capacities of the "continental economic area" were the prerequisite for "regaining and securing the global standing of the German chemical industry."[41] In the following months, such declarations of intent were by no means only made in the arcane realm of the planning staff and their official correspondence partners. While the southern Europe experts at I.G. Farben were internally fighting against what they saw as the Nazi leadership's overly concessionary attitude to the division of the German-Italian sphere of interest in the Balkans, Carl Krauch publicly stated in the I.G. Farben monthly magazine *Von Werk zu Werk* in April 1941 that the self-sufficiency of the European economy "with essential goods" was only guaranteed if the greater European area included "the Mediterranean region and Africa in Europe's sphere of influence".[42] It was taken for granted that the "military-economic" interests of the "Greater German" core zone would always come first in the future, and none of the

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[40] Janis Schmelzer: *Europapatent. The IG Farben project for the reorganization of Europe* (Aus der Ge- schichte der Filmfabrik Wolfen, H. 15, ed. by Kommission Betriebsgeschichte). Bitterfeld: Electrochemical Combine 1967, p. 13.

[41] I.G. Farbenindustrie AG, Berlin NW 7, attn. Schnitzler and Krüger, to Ministerialdirigent Schlotterer in the Reich Ministry of Economics, 2.8.1940, NI-11252. SfS Archive, I.G. Farben Trial, ADB 51.

The managers involved doubted that the main purpose of forming their own power bloc was "to ensure a purposeful and effective management of the inevitable confrontation with the large non-European economies that are already emerging today."[43]

However, these martial declarations of intent to expand the European war to a global war of revision did not lead to coherent concretization at the planning and action level. This can be explained by the failure of the invasion plans against England in the fall of 1940 and the failure of the German blitzkrieg offensive against the Soviet Union a year later. The political conditions for this were now lacking. The command staffs of the

I.G. Farben merely agreed to use what it considered to be the secure restauration of the German colonial empire as leverage for targeted interventions in the chemical and pharmaceutical trade with the French, Belgian and Dutch colonies and to seize the British colonial markets insofar as they were important for its production range. With the exception of Canada, the British chemical industry was to be completely separated from its European and Commonwealth markets so that I.G. Farben could take over its export business. However, despite massive pressure from the authorities, no further decisions were made regarding how to deal with its main British competitor, Imperial Chemical Industries (ICI), and access to the British Commonwealth beyond the chemicals trade, because every step in this direction depended on the future attitude of the USA.[44]

The USA, however, was the decisive Achilles' heel of I.G. Farben's global hegemonic ambitions. It had considerable assets and holdings there indirectly - mediated by the Swiss financial holding company I.G. Chemie - and continued to cooperate with the Standard Oil Group in key areas of high-pressure chemistry and nuclear research despite its "large-scale economic" change of course during the global economic crisis. Due to its strategic decisions, the I.G.

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42 Carl Krauch: The chemical industry in the European economic area. In: *From plant to plant. Monthly magazine of I.G. Farbenindustrie AG,* April 1941, p. 51.

43 General part of the I.G. Farben memorandum of August 3, 1940, NI-11252, p. 15. SfS Archive, I.G. Farben Process, ADB 51.

44 Georg von Schnitzler to the members of the Commercial Committee, 22.10.1940, NI- 6955. SfS Archive, I.G. Farben Process, ADB 51.

leadership therefore had vital economic and technological interests of its own. It attempted to solve the dilemma by developing a multi-pronged tactic that was probably not conceptually thought through, but rather resulted from an accumulation of improvisations and acute constraints on action.

First of all, the Group's top management and the Commercial Committee tried to play it safe.[45] With the help of their Swiss partners, they disguised their overseas sales offices and holdings, using the managers of I.G. Chemie as trustees and straw men. In May 1940, they took the next step and severed their ties with I.G. Chemie after their Basel partners and the managers of the General Aniline & Film Corporation had strongly urged them to do so. Hermann Schmitz resigned as Chairman of the Board of Directors of I.G. Chemie. The dividend guarantee agreement and the buy-back option were terminated, and by August 1940 I.G. Chemie's share capital had also been largely "Swissized". All this obviously happened without any side agreements. Although I.G. Chemie remained closely linked to I.G. Farben both personally and economically, the players hoped to avoid a repeat of the seizure, forced administration and expropriation of the US branches of I.G. Farben's predecessor during the First World War. I.G. Chemie was now a de facto independent financial holding company that controlled the increasingly "Americanized" subsidiaries in the USA. The General Aniline & Film managers rejected further demands to transfer the major share packages to the USA in order to eliminate the last pretext for sequestration. I.G. Farben would certainly have survived this risky operation without the complete loss of its Swiss and US holdings if Germany had won the war.

The second lever on which the financial experts and businessmen at I.G. Farben relied was the understanding with their US partners in the oil and chemical industry.[46] Until the early summer of 1940, there were repeated meetings with top managers of Standard Oil, and even in the sensitive areas of armaments technology, the exchange of patents and know-how was only restricted at a late stage. At the same time, I.G. Farben managers always acted in full coordination with the military and economic authorities. This behavior can only be seen as an attempt to keep the Rockefeller-Ford group, which was particularly open to the Nazi dictatorship, happy.[47] The aim was to strengthen the isolationist camp in order to keep the USA out of the war for as long as possible, if at all. Only when Franklin D. Roosevelt was elected US President for the third time at the end of 1940 - a first in US history - were these hopes finally dashed and I.G. Farben discontinued its technology transfer. But even after the German declaration of war against the USA, the Standard I.G. contract was not terminated in order to retain the managers of the Standard Oil Trust as cooperation partners.[48]

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[45] For the following, see SfS Archive, I.G. Farben Process, ADB 50; OMGUS: Investigations against I.G. Farben, pp. 71ff., 109ff.; Mario König: *Interhandel. The Swiss holding company of IG Farben and its metamorphoses - an affair of property and interests (1910-1999).* Zurich: Chronos 2001, pp. 69ff., 90ff.

On their third level of planning and action, the managers of I.G. Farben built on their concept of the "large-scale" confrontation and focused on the USA as the decisive arena for their world market strategy. As early as the beginning of August 1940, I.G. Farben expressed itself clearly and unambiguously in this regard in the "General Section" of its memorandum on post-war planning:[49] The battle for the reorganization of the world market would be fought with the "North American corporations". They would concentrate on Latin America after being forced out of the Euro- pean business, especially as new development opportunities existed there. Pan-Americanism was also reinforced by the fact that England had lost its role as financier of Latin America and was being replaced by the USA. The second center of the dispute with the USA

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[46] SfS Archive, I.G. Farben trial, ADB 42 and 43; Joseph Borkin: *Die unheilige Allianz der I.G. Farben. A community of interests in the Third Reich.* Frankfurt am Main / New York: Campus 1969, p. 75ff.; Frank A Howard: *Buna rubber, the birth of an industry.* New York: Van Nostrand 1947, pp. 169ff., 178ff., 188ff.

[47] Cf. in detail from a critical US perspective Charles Higham: *Trading with the Enemy. An Exposé of the Nazi-American Money Plot 1933-1949.* New York: Delacorte 1983, pp. 53ff., 151ff., 175ff.

[48] Wolfgang Heintzeler: The impact of the war on contracts between German and US companies, with particular reference to the Standard Oil contracts. Presentation at the meeting of the Legal Committee on March 26, 1942. NARA II, RG 84, Container 233, Folder 26.

[49] SfS Archive, I.G. Farben Trial, ADB 51, Doc. NI-11252, General Part, pp. 15ff.

The main battle, on the other hand, would be in the British and Dutch Indies and the Far East, but its outcome also depended on the extent to which Europe could hold its own against Japan. In fact, Latin America became the scene of a bitter propaganda and economic war long before the USA entered the war. Until the end of the war, the Berlin headquarters of I.G. Farben invested considerable resources to save its disguised holdings and sales companies, to undermine US alliance efforts and to support the economic and political circles that sympathized with the German colonies and the Nazi dictatorship.[50]

These multi-layered and disparate efforts of I.G. Farben's businessmen and financiers to achieve supremacy in the world's chemical industry were contrasted with the programmatic determinations of its group of technicians, which, although also intended to remain piecemeal, were systematically thought through and driven forward with the greatest energy. Their aim was to consolidate and further develop all previous lines of catalytic high-pressure chemistry. The group of technicians had chosen the easternmost I.G. Farben plant in Auschwitz as the central location for the completion of their technocratic visions. As Otto Ambros explained at the sixth meeting of the Rubber Commission, I.G. Farben was thus following the efforts of the "Reichspla- nung", which aimed for "a stronger industrial development of the East", and had moved into the immediate vicinity of the Upper Silesian mining industry due to the even greater dependence of large-scale syntheses on coal.[51] Other resources were also abundant in this south-western corner of the annexed Polish territories: Water, lime pits, electrical energy - and the forced labor pool of the neighboring Auschwitz concentration camp. The significance of the concentration camp in the location decision was hotly disputed in the I.G. Farben trial and in the research literature since then, but the controversy can be considered settled since Bernd C. Wagner's study published in 2000. Wagner's study published in 2000.[52]

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[50] SfS Archive, I.G. Farben trial, ADB 49; OMGUS: Investigations against I.G. Farben, pp. 141ff., 174ff.

[51] Excerpt from the minutes of the 6th meeting of Commission K on October 23, 1941 in Hüls on the development of Buna IV, NI-7288. SfS Archive, I.G. Farben Process, ADB 29.

[52] Bernd C. Wagner: *IG Auschwitz. Forced labor and extermination of prisoners of the Monowitz camp 1941-1945.* Munich: Saur 2000, p. 37ff. See also the review of the

At this meeting, the chemical-technical conversion cycles of the projected mammoth plant, in which I.G. Farben was to invest 610 million RM by the end of the war, were also presented.[53] They were based on the decision to combine the construction of a Buna plant with a capacity of 30,000 tons per year agreed for I.G. Auschwitz with the construction of an isooctane factory, which was to supply the Luftwaffe with 25,000 tons of high-performance petrol per year. The planning and design of the complex was the direct responsibility of the company's top management, and the historical centers of I.G. Farben's catalytic high-pressure chemistry - Ludwigshafen, Oppau and Leuna - worked closely together to implement the project.

But this was only the outer framework that integrated the I.G. Auschwitz project into two decisive production lines of the armaments industry. An analysis of the interlocking conversion cycles of the plant complex clearly shows that the project encompassed the entire spectrum of hydrocarbon chemistry originating from coal and brought together its most important sectors, acetylene and ethylene chemistry, with the subsequent syntheses of the dawning plastics age derived from methanol synthesis. At the same time, however, all troop units and the processors of the basic armaments materials were to be optimally supplied. As the main exponents of the project proudly stated immediately after the war, in drastic misrecognition of their current situation, they had already achieved a lot in the factory of the

I.G. Farbenindustrie Auschwitz O.S. "transferred the laboratory results of I.G. Farbenindustrie into practice."[54]

Controversy in Sybille Steinbacher's monograph on the regional and population policy contexts of I.G. Auschwitz: Sybille Steinbacher: *"Musterstadt" Auschwitz. Germanization policy and the murder of Jews in Eastern Upper Silesia.* Munich: Saur 2000, p. 205ff.

[53] Excerpt from the minutes of the 6th meeting of Commission K on October 23, 1941 in Hüls on the development of Buna IV, NI-7288, Top 4: Kurt Eisfeld: Buna IV Auschwitz. Development of planning and status of construction work. SfS Archive, I.G. Farben Trial, ADB 29.

[54] Publications of German scientific research and technical processes in recent years. In: *Angewandte Chemie* 59 (1947), No. 5/6, p. 182; I would like to thank Florian Schmaltz for this reference. The following information is based on Eisfeld's presentation of October 23, 1941. Supplementary literature on the technological context: Alfred von Nagel: *Methanol - Treibstoffe. High-pressure syntheses at BASF.* (Series of publications from the company archives of Badische Anilin & Soda-Fabrik AG, H. 5) Ludwigshafen: BASF 1970; Ders.: *Äthylen - Acetylen.* (Series of the company archives of Badische Anilin & Soda-Fabrik AG, H. 7) Ludwigshafen: BASF 1971; Reppe: Auswirkungen der Acetylen- und Kohlenoxyd-Chemie; Walter Reppe: Neue Entwicklungen auf dem Gebiet der Chemie des Acetylens und Kohlenoxyds. In: *Experientia,* Vol. V, Fasc. 3, March 15, 1949, pp. 93-132; for the historical context, see http://www.wollheim-memorial.de/de/was_sollte_die_ig_auschwitz_produzieren.

I.G. Auschwitz was designed as a "dual" project from the outset: It was to be available for warfare and the maintenance of a strategic deterrent potential after the "final victory", while at the same time being equipped for mass production in the dawning age of plastics. The air force was to be supplied with isooctane and highly viscous lubricating oils through modified methanol synthesis, the army with chemical weapons (phosgene and stabilizers), the navy with fuel oil from the modified Fischer-Tropsch process[55] and the rubber industry with Buna S, which was important for all types of weapons. I.G. Farben's post-war private-sector projects were interwoven into these "war-important" components: starting with methanol synthesis and the by-products of the Reppe and isooctane processes, it wanted to develop all new material classes for plastics production in order to catch up on the backlog it had fallen into since 1938/39 in the international race into the new age of plastics.

Unfree labor - Destruction through labor

To their great surprise, the managers of I.G. Farben were confronted with a problem area from 1937/38 onwards that began to increasingly jeopardize their course of expansion and rearmament: the "workers' question".[56] However, due to the self-nazification and militarization of the company's management structures that had been enforced in 1933 and 1935, they believed that new sources of conflict in this area were completely out of the question. They

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[55] In the Fischer-Tropsch process developed in 1935/36, mineral oils and their derivatives are not obtained by high-pressure synthesis, but by converting coke in gas generators to water gas and then hydrogenating carbon monoxide. For the technical details and the competitive position of the process compared to coal high-pressure hydrogenation, see Boy Cornils: Die Fischer-Tropsch-Synthese von 1936 bis 1945. Treibstoffsynthese oder Basisreaktion für Chemierohstoffe? In: *History of Technology* 64 (1997), No. 3, pp. 205-230.

[56] For the following sections on the period up to the turn of the year 1939/40, see Valentina Maria Stefanski: *Zwangsarbeit in Leverkusen. Polish youths at the I.G. Farben factory.* Osnabrück: fiber 2000, p. 59ff.; Herbert Bode / Manfred Gill (ed.): *Zwangsarbeiter in der Filmfabrik Wolfen 1939-1945. Ihre ökonomische und soziale Lage und Unterbringung dargestellt mit postalischen Belegen* (Aus der Geschichte der Filmfabrik Wolfen, H. 49). Wolfen: Kommission für Betriebsgeschichte 1982, pp. 11ff; Karl Früholz: *Das System der Zwangsarbeit in den Be- trieben der IG-Farbenindustrie Aktiengesellschaft unter den Bedingungen des staatsmonopo- listischen Kapitalismus während der Vorbereitung und Durchführung des Zweiten Weltkrieges,* Dissertation, Humboldt-Universität Berlin (Ost) 1963, pp. 93ff; Timothy W. Mason: *Arbeiter- klasse und Volksgemeinschaft. Documents and materials on German labor politics 1936-1939,* Opladen: Westdeutscher Verlag 1975, pp. 665ff., 1042ff.

It therefore took quite a long time for them to recognize the changed labour conditions and begin to react. There was a shortage of construction workers on the large construction sites of the Buna and fuel plants, and significant parts of the core workforce of the main plants began to migrate to the booming metal and heavy industry due to the low wages in the chemical sector. The plant management tried to counteract this by increasing the weekly working hours to 56 hours in consultation with the General Plenipotentiary for Special Issues in Chemical Production (GBChem) and sending recruiters to the newly annexed territories, who hired the first foreign workers from Austria, the Sudeten regions and, from the summer of 1939, from the Protectorate of Bohemia and Moravia. In addition, they made use of the compulsory service ordinance proclaimed on June 22, 1938 and the subsequent decrees of the Labor Deployment Business Group of the Four-Year Plan Authority, which increasingly restricted the freedom of movement of wage earners, and tied the first German "Dienstverpflichte" to their jobs.

Immediately after the start of the war, the freedom of movement of workers was restricted even further. In particular, a decree restricting job changes gave company managements further instruments under labor law, which robbed the workforce of the opportunity to take advantage of the opportunities they had to improve their situation due to the progressive shortage of labor. Added to this was the division of the male workforce into "indispensable" (u.k.) regular workers and those who were released for military service. As a result of years of preparations for mobilization for the war, only around 15 to 20 percent of the I.G. Farben workforce was drafted into the Wehrmacht. However, the retention of the male core workforce was limited in time and could be revoked at any time in individual cases.

From the spring of 1940, a wild hunt for additional manpower began, with all decision-making and management levels of the conglomerate gradually becoming involved.

the company communities and the factories.[57] The first step was obviously taken by Placement Office W: in March 1940, it passed on an offer from the Reich Aviation Ministry for the allocation of Polish workers to the plant communities and main plants. They took up the offer immediately, and the Berlin headquarters arranged the first major wave of allocations at the top level of the Reich authorities. This initial experience soon turned into a rou- tine. Placement Office W passed on the demand figures that were now regularly submitted to it to all conceivable "contingent carriers", which varied depending on the legal and social status of the workers requested: It procured temporary foreign workers from Western Europe and Denmark primarily through the Reichsstelle Chemie, it ordered prisoners of war from the Wehrmacht's Chief of POW Affairs and, from mid-1942, it obtained Polish, Ukrainian and Soviet forced laborers from the newly established offices of the General Plenipotentiary for Labor Deployment. In 1940/41, the Office of the Plenipotentiary General for Special Issues of Chemical Production became the second inter-company coordinating body by extending its labor policy activities beyond the borders of the "Greater German" core zone. It delegated I.G. Farben executives to the friendly and occupied countries, where they set up training courses for chemical workers, encouraged collaborators to set up temporary employment companies, hired subcontractors and concluded contracts with the associations of industrial construction companies, whereby, for example, in spring 1942, 40 Italian companies with around 2,550 to 3,000 of their employees were engaged as contractors for the Heydebreck, Blechhammer and Auschwitz projects.[58] But the Group's top managers also took every opportunity to persuade their European affiliated companies, such as Francolor S.A., to hand over skilled workers. Carl Krauch, who in the meantime

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[57] Key documents for the following sections: SfS Archive, I.G. Farben trial, ADB 67- 71, 92, 93; Stefanski: Zwangsarbeit in Leverkusen, p. 71ff.; Früholz: System der Zwangsar-beit, p. 105ff., 127ff., 135ff., 152f.

[58] Contract of the National Fascist Federation of Construction Companies with I.G. Farbenindustrie, Werke Heydebreck und Auschwitz, and Oberschlesische Hydrierwerke AG, Blechhammer, dated March 14, 1942. SfS Archive, Deichmann Collection, No. 1; Cesare Bermani: Odyssey in Germany. The everyday experience of Italian "foreign workers" in the "Third Reich". In: Cesare Bermani / Sergio Bologna / Brunello Mantelli: *Proletarier der "Achse".*

Heinrich Bütefisch and Otto Ambros, who were co-opted into Himmler's circle of friends, paved the way for access to those labor reserves that were deprived of all rights of existence and were at the disposal of the SS Economic and Administrative Main Office.

Based on this diverse support, the works directorates and technical commissions of the factories gradually systematized their labour market policy activities, pursuing every opportunity to increase their workforce numbers with energy and perseverance.[59] They not only lobbied the respective local and regional labor regional labor authorities and the armaments commands, but also sent their own recruiting columns into the occupied territories - often without consulting Krauch's regional representatives, negotiated with the general prosecutors of the higher regional court districts about the transfer of prisoners to their labor camps and, from 1942/43, also approached the central Reich authorities directly in order to play off any special relationships with the SS leadership, the Luftwaffe, the General Plenipotentiary for Labor Deployment and the heads of the occupation administrations. If there were any collisions with competing "suppliers", the Chairman of the Supervisory Board and General Plenipotentiary for Chemicals would protect them. Even in the final phase of the war, Krauch pulled out all the stops to reject the efforts of the "Central Planning" of the Ministry of Armaments and the General Plenipotentiary for Labor Deployment, which aimed to curtail these excesses in the basic chemicals industry.

This unrestrained access to as yet untapped labor reserves was unprecedented and clearly surpassed the by no means squeamish recruitment methods of the other large companies in the armaments industry. In order to understand this phenomenon, we can dispense with any considerations of economic ethics and fall back on a banal and plausible explanation that Ernst A. Struss, the head of the Technical Committee's office, gave after the end of the war.

Sozialgeschichte der italienischen Fremdarbeit in NS-Deutschland 1937 bis 1943. Berlin: Akademie 1997, pp. 37-252, here pp. 174ff.

[59] For the following, see SfS Archive, I.G. Farben Process, ADB 68-71, with extensive source documents on the labor market policy activities of the TEA and the Technical Commission as well as from various plants of I.G. Farbenindustrie AG.

It had been customary since 1940 for the Technical Committee (TEA), chaired by Fritz ter Meer, to obtain workforce statistics from a central personnel statistics office at I.G. Farben in Leverkusen before making its decisions on the investment funds to be distributed to the various plants.[60] Before each meeting, they were converted into charts that precisely documented the shifts in workforce numbers and their worker categories, "because Tea calculated the distribution of loans for new buildings to the various plants based on the number of workers. In other words, the Tea used the charts to draw conclusions about what the individual plants could build."[61] This distribution formula was then formally adopted at the board meeting held the following day. It was a perfidious system: the companies only received the investment funds they applied for if they were able to identify the workforce required to build and operate the plants in advance. They therefore felt compelled to hoard as many and as cheap workers as possible in order to achieve their economic goals. It was this fact that made them so inventive in their manhunts and, after the influx of foreign workers and prisoners of war had dried up, led them right into the offices of the general prosecutors and concentration camp commanders.

The breadth and multi-pronged nature of the recruitment methods was reflected in the enormous diversity of workforce structures in terms of labor law, social, ethnopolitical and national characteristics, which can be described by the usual terms

"foreign workers - forced laborers" or "Germans - foreigners".[62] The differentiation grid of the personnel statistics center in Leverku- sen went far beyond this and classified the various categories of workers according to sometimes simple, but sometimes also quite complex characteristics.[63] It not only differentiated between men and women in the German workforce group, but also between regular workers and employees.

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[60] Ernst A. Struss, affidavit, March 27, 1947, NI-4999, SfS Archive, I.G. Farben Process, ADB 68.

[61] Ibid, p. 1.

[62] For examples, see the minutes and correspondence of the Technical Commissions and the Directors' Conferences of Leuna and Leverkusen in: SfS Archive, I.G. Farben Process, ADB 69.

[63] Büro Dr. Bertrams, personnel statistics, workforce figures, Vol. 9 and 10, BAL, 265-53.

workers, conscripts and those on military leave. It also differentiated between workers from German and foreign contractors and between German and foreign temporary workers. Prison workers were broken down into prisoners of justice, Wehrmacht prisoners and concentration camp inmates. Prisoners of war and civilian foreign workers, on the other hand, were categorized according to the usual national patterns, with only Poles being explicitly classified as forced labourers. This was certainly arbitrary, as many factory managements had also relied on

"Eastern workers" were used. However, Western European and Italian temporary workers, contractors and individual workers were also arrested and interned after escaping from increasingly unbearable and dangerous working conditions if they came under the search machinery of the security police in Germany, their home countries or in the occupied territories. In contrast to the technical and commercial cadres, who were provided with individual employment contracts from foreman and clerk level upwards, the freedom of movement of the workers was restricted throughout. Nevertheless, their working, accommodation and survival conditions were extremely varied, and this, together with the enormous cultural and language barriers, prevented the emergence of communication structures that could have broken through the fragmented insularity of the respective categories of workers and prevented the barbaric exploitation of the particularly discriminated segments.[64] Solidarity structures could hardly develop because the few better-supplied forced labor groups could not share their food rations with the masses of impoverished workers.

"Eastern workers" and concentration camp prisoners.[65] In addition, workforces were constantly shuffled. The fluctuation had been so great since 1941/42 that the workforces of the main factories, with the exception of the ever-increasing

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[64] On the empirical-analytical differentiation of unfree labor relations in the Nazi dictatorship, see Karl Heinz Roth: Unfreie Arbeit im deutschen Herrschaftsbereich 1930-1945. Historische Grundlinien und Methodenfragen. In: Werner Röhr / Brigitte Berlekamp (eds.): *"Neuordnung Europas". Lectures to the Berlin Society for Research on Fascism and World War II 1992-1996*. Berlin: Edition Organon 1996, pp. 199-218.

[65] As a review of the extensive testimonies and autobiographies of Soviet forced laborers and concentration camp prisoners shows, only individual acts of help are documented. Because they were always an exception to the rule, they were acknowledged in detail and with gratitude.

The company's shrinking core squad was completely replaced within one and a half to two years.

Regardless of these common fluctuation and fragmentation processes, the workforce structures of the approximately 100 construction projects, factory complexes and affiliated companies of I.G. Farben varied considerably. Only the lei- ning employees and management had a fairly homogeneous structure, but the longer the war lasted, the more it was thinned out by the withdrawal of key employees to the newly built "Ostwerke" and the trustee companies in the occupied territories. The core workforce of German craftsmen, laboratory technicians and chemical workers suffered a similar fate: although their u.k. positions were only abolished in the wake of the major conscription waves of 1942 and 1943, they too increasingly transferred skilled workers to the new locations in the East. Despite this, internal migration within the company was limited, with the result that around 60 percent of the core workforce at the main plants in western and central Germany was retained, while on the construction sites of the "eastern plants" they were increasingly deployed to supervise construction companies from outside the company and only made up around a quarter of the workforce at the new production sites. Significantly fewer foreign workers and prisoners of war were used in the west and central Germany than in the east, who came in in several waves of recruitment and were gradually promoted to semi-skilled and unskilled workers. This was followed in 1943/44 by a final wave of forced laborers, prisoners and concentration camp inmates, who occupied the lowest social position in the workforce. They were deployed in columns for the hardest construction and relief work and guarded in separate camps, so that they remained separate from the multinational archipelago of workers and could hardly coordinate their survival strategies with them.[66]

In the last years of the war, all I.G. Farben factories were surrounded by huge camp complexes, which were converted into communal camps for German service personnel.

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[66] The fate of the forced labourers in the last wave of recruitment for the decentralized construction projects and production facilities of I.G. Farben and its associated companies is documented in many places in: Wolfgang Benz / Barbara Distel (eds.): *Der Ort des Terrors. History of the National Socialist Concentration Camps*. Munich: Beck 2005 (vol. 2), 2006 (vol. 3), 2007 (vols. 5 and 6). The detailed studies contained therein are referred to below.

The camps were divided into special camps for prisoners of war and Eastern European forced laborers, as well as the satellite camps of the concentration camps. As early as February 1943, around half of the workers' populations were housed in these camp agglomerations. The I.G. had by then increased capacity to 108,593 places with 70,543 foreign workers, 19,958 Germans,

14,156 prisoners of war, 2,195 Wehrmacht prisoners of conscience and 1,741 other laborers; the factory complex of

The "Buna camp" opened by I.G. Auschwitz with its 1,700 concentration camp prisoners was not yet included in this list.[67]

The amount of energy expended by the company's top management and factory management to recruit, accommodate and exploit the ever-growing sector of the factory workforce was therefore considerable. The stronger and faster this part of the workforce expanded and even began to outstrip the core workforce from the east towards the end of the war, the greater the associated security problems became. In addition, the question increasingly arose as to what methods could be used to force the new segments of the workforce, who were less and less motivated and less and less disciplined by industrial work experience, to perform work that was considered adequate. As part of its preparations for mobilization, the company management had also worked on this terrain for a long time, but it had to adapt its security planning and its internal command to the rapidly changing realities and constraints of increasing the production volume of the arms industry at all costs.

In the first few months after the start of the war, the company, which had become

"Board member Christian Schneider[68] appointed the Group's internal intelligence and security service by setting up an "Office A" under his authority at the Leuna plant and replacing the former senior counterintelligence staff of the central office in Berlin NW 7 Heinrich Diekmann and Erich von der

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[67] Bode / Gill (ed.): Forced laborers in the Wolfen film factory, p. 42.

[68] For Christian Schneider, see the biographical entry at http://www.wollheim-memorial.de/en/christian_schneider_18871972.

Heyde[69] was made responsible for the technical and commercial side of plant security.[70] At the same time, the staffs of the respective plant security officers were expanded and the full-time plant security units subordinate to them were armed, strengthened by part-time cadres and trained at a plant security school run by the Reich Main Security Office. As the defense officers had themselves been appointed auxiliary Gestapo officers since the beginning of the war, close cooperation with the security apparatus of the Nazi dictatorship was guaranteed. However, the Wehrmacht's defence and armaments departments also made their voices heard from the spring of 1940 and arranged for the measures agreed in the mobilization plans to be implemented more quickly. Where they had not already done so, the factories were fenced in, equipped with gate and ID checks and alarm units to ward off sabotage. In this context, the defense experts at I.G. Farben also discovered the foreign workers as potential Trojan horses. After a meeting with the senior officers of the Wehrwirtschafts- und Rüstungsamt, which had meanwhile been upgraded to the Wehrwirtschaftsstab, Diekmann issued guidelines on the employment of foreigners in protected chemical industry plants on 23 July 1940, whereby he instructed those responsible for defence at his company to ethnicize the security problem:[71] The foreign workers were only to be deployed in closed columns, carefully guarded and housed and fed separately. In addition, their deployment in "exceptional operations" that were particularly important to the "defence economy" and therefore susceptible to sabotage was to be completely avoided and they were to be directed primarily to those production areas that were particularly suitable for "defence" surveillance due to their standardized production structures.

However, these provisions soon proved to be illusory, as the number of foreigners increased by leaps and bounds and larger and larger areas of the plant were being built.

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[69] For Erich von der Heyde, see the biographical entry at http://www.wollheim-memorial.de/en/erich_von_der_heyde_1900unknown.

[70] SfS Archive, I.G. Farben trial, ADB 6, 7 and 8; Klaus Drobisch: Der Werkschutz - betriebliches Terrororgan im faschistischen Deutschland. In: *Jahrbuch für Wirtschaftsgeschichte* 1965, Part IV, pp. 217-247, here pp. 219ff.

[71] Heinrich Diekmann, Vermittlungsstelle W der I.G. Farbenindustrie AG: Richtlinien für die Beschäftigung von Ausländern in geschützte Betrieben der chemischen Industrie, 23.7.1940. BArch-MA, RW 19, Nr. 3510.

They fell into the category of companies requiring special protection. As a result, from the turn of the year 1941/42 onwards, they could only be maintained in the face of prisoner-of-war labor, Soviet forced laborers and prisoners. At the same time, however, the direction of the "defense" measures also changed. While sabotage campaigns were directed at the affiliated companies in Norway and France as well as the new

"Ostwerke",[72] the "marginal workforce" developed barely comprehensible forms of individual refusal, which, thanks to their mediation by the German workers, gradually penetrated the hard core of the core workforce: They arrived late or did not show up for their shifts at all, left their workplaces regardless of the state of the chemical conversion processes and began to fight back against their foremen's and master craftsmen's accusations.[73] The engineers and technical department heads were dismayed and began to statistically record and isolate this new phenomenon of worker insubordination. After a few months they had understood it, and from the summer of 1942 they coordinated their countermeasures within the framework of the company communities: Anyone who dawdled once was given a serious warning and had to make up the lost time without pay. In the event of a repeat offense, he/she also had to spend the camp recreation time in a detention room run by Works Security. If he/she was still not adequately disciplined, he/she was deprived of food for a few days - a particularly dreaded punishment. Additional sanctions were also imposed at this stage: Reporting to the labor trustee and, from 1943/44 onwards, above all to the Gestapo, who then took the delinquents into "protective custody". Nevertheless, "deliberate labor cheating" became more and more widespread: Between April and July 1943, 5,918 violations of company regulations were reported in Leuna, of which 4,477 were punished with a variety of penalties; in addition, 334 "labor cheats" were handed over to the Gestapo. Since the

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[72] For example, Monowitz inmate Hans Frankenthal reported in his memoirs that fellow inmate Fred Salomon, who was employed as an electrician, worked in a power station turbine at the I.G. Farben plant in Auschwitz triggered a short circuit, see Hans Frankenthal: *Verweigerte Rückkehr. Experiences after the murder of the Jews*. Frankfurt am Main: Fischer 1999, p. 74f.

[73] On this and the following Früholz: System der Zwangsarbeit, p. 198ff.; Stefanski: Zwangsarbeit in Leverkusen; Martin Pabst: *"Und ihr wollt nichts gehört noch gesehen ha- ben?" The chronicle of the Zöschen labor education camp from July 1944 to April 1945. Documents and eyewitness accounts.* Halle (Saale): Mandel 2000, pp. 25ff., 33ff.

In the spring of 1943, the counter-intelligence officers at the large factories and company communities established close networks with the Gestapo offices, which became involved in monitoring the factory camps and set up "labor education camps" (AEL) to discipline the particularly recalcitrant. In addition, "special labor education offices" were set up in some of I.G. Farben's main plants, which collected the false reports after the start of the shift and instructed the camp managers to arrest those who refused to work. This led to a cat-and-mouse game between the workforce and the management beyond the front lines of traditional labor disputes, in which the reprisals for forcing workers to work became more and more sophisticated in order to avoid having to hand over too many workers to the security police.

Some of those who were nevertheless passed on to the Gestapo returned to another I.G. Farben factory after some time - as Gestapo or concentration camp prisoners. Here, the techniques of forced labor were combined with open terror, but only a few of those who were smuggled into the cycle of "extermination through labor" had previously experienced the escalation stages of the "Bummelantenbekämpfung" ("combating slowpokes"). The managers of I.G. Farben made use of this special labor resource earlier and more intensively than any other private company, which was offered for sale, rented out and invoiced by the Inspection of Concentration Camps of the Main Economic and Administrative Office of the SS.

The first access took place in March 1941 when the planning and excavation work for the I.G. Farben plant in Auschwitz began.[74] Until the camp quartering in July 1942, the commandant's office of the Auschwitz concentration camp provided the construction management with a total of around 5,000 prisoners for a "Kommando Buna", of whom at least 700 perished in work accidents, died of exhaustion or were killed. After the opening of the "Buna IV" concentration camp, 25,000 more prisoners were sent to build the largest concentration camp in the world.

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[74] For the following, see the detailed discussion of the death toll of the Buna/Monowitz concentration camp in Florian Schmaltz: Die Totenzahlen des KZ Buna/Monowitz. Fritz Bauer Institute / Goethe University Frankfurt am Main: Norbert Wollheim Memorial 2009, http://www.wollheim-memorial.de/files/1051/original/pdf_Florian_Schmaltz_Die_Totenzahlen_des_KZ_BunaMonowitz.pdf. The figures, which were overestimated in the previous research literature, are also discussed there and new minimum and maximum estimates are made on the basis of the documents provided. I have used the minimum estimates for my calculations relating to the group as a whole.

"Ostwerk" of I.G. Farben. Around 8,000 of them were murdered in the Auschwitz I concentration camp and in Auschwitz-Birkenau after their labor was used up, while a further 1,670 died on the construction sites or were killed in the camp. Of the total of 30,000 concentration camp prisoners deployed in the construction of the I.G. Auschwitz plant, 10,370 died - not including the three mining subcamps.[75]

In the fall of 1943, the Monowitz system spread to the Fürstengrube, Janinagrube and Güntergrube mines, which had been operated by I.G.-Beteiligungsge- sellschaft Fürstengrube GmbH since 1942 and supplied the hard coal for the I.G. Auschwitz project.[76] As in Monowitz, a narrow layer of German employees and foremen ruled the workforces in the mines, which were mainly made up of Polish and Soviet forced laborers, prisoners of war and concentration camp inmates.[77] Existing prisoner-of-war and forced labor camps were cleared for the work detachments of concentration camp prisoners and new satellite camps were also built. Around 1,900 concentration camp prisoners were rented out for the murderous work in the Fürstengrube, 1,000 in the Günthergrube and 1,800 in the Janinagrube, mainly Jewish, in order to maintain an average occupation rate of 900, 450 and 800 prisoners by rotating the exchange of those no longer able to work for new labor slaves from the main camp.

I.G. Farben also used concentration camp prisoners as forced laborers for its C-weapons projects. The subsidiary Anorgana GmbH and Luranil Bau- gesellschaft mbH, also based in Ludwigshafen, acted as coordinating actors in the construction of the Gendorf, Dyhernfurth and Briesen-Falkenhagen weapons plants as operating companies of the Reich-owned Montan GmbH.

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[75] These figures, compiled from the available sources, are in line with the latest research findings in Polish historiography. See in particular Piotr Setkiewicz: *Zdziejów obozów IG Farben Werk Auschwitz 1941-1945.* Oświęcim: Państwowe Muzeum Auschwitz-Birkenau 2006, pp. 156-163; Ders.: Mortality among the Prisoners in Auschwitz III-Monowitz. In: *Pro Memoria. Information Bulletin* 26 (2007), p. 61-66. The figures given in the research literature to date are obviously inflated, see most recently Wagner: IG Auschwitz, p. 280ff.

[76] SfS Archive, I.G. Farben Process, ADB 80 and 81.

[77] On this and the following Andrea Rudorff: Fürstengrube. In: Benz / Distel (eds.): *The Place of Terror. Vol. 5 Hinzert, Auschwitz, Neuengamme*. Munich: Beck 2007, pp. 221-225; This:

the company.[78] Two years after the start of construction of the Tabun factory in Dyhernfurth on the Oder in Lower Silesia, Luranil Baugesellschaft hired 180 Polish-Jewish forced laborers from the Upper Silesian "Special Representative of the Reichsführer SS for the Use of Foreign Nationals for Labor", Erich Schmelt, whose number had increased to 800 by the summer of 1943. Following the decision in May 1943 to double the production of Tabun, it had them transferred to a subsidiary camp of the Groß-Rosen concentration camp that had been set up in the meantime and procured further prisoner laborers from there, so that the occupancy of the camp ("Dyhernfurth II") for construction prisoners increased to over 3,000 by autumn 1944. After the production of poison gas had started, the operating company Anorgana GmbH had a second satellite camp ("Dyhernfurth I") built in the summer of 1943, which was reserved for the accommodation of 300 prisoners who were used in the filling and loading facilities, .[79]

At its first plant in Gendorf in the district of Altötting, which Anorgana GmbH took over in 1940 and expanded further, the management also used concentration camp prisoners in October 1943 because it needed skilled workers (pipe fitters and welders) who were not available on the regular labor market to convert part of the plant to the preliminary products of artillery ammunition. After setting up a satellite camp within the factory premises, Ambros managed to recruit 250 concentration camp prisoners from the Dachau concentration camp, but they were only partially qualified and were therefore also forced to carry out excavation work and defuse unexploded ordnance. Since

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Günthergrube. In: Benz / Distel (eds.): Der Ort des Terrors, vol. 5, pp. 243-247; This: Janinagrube. In: Benz / Distel (eds.): The Place of Terror, vol. 5, pp. 256-260.

[78] Cf. on the following: SfS Archive, I.G. Farben trial, ADB 13 and 36; Alfred Konieczny: The forced labour of Jews in Silesia within the framework of the "Organization Schmelt". In: *Social policy and the extermination of Jews.* (Beiträge zur nationalsozialistischen Gesundheits- und Sozialpolitik, vol. 5) Berlin: Rotbuch 1987, pp. 91-110; Schmaltz: Kampfstoff-Forschung, pp. 163ff.; Aleksandra Kobielec: Dyhernfurth I. In: Benz / Distel (eds.): *Der Ort des Terrors. Vol. 6.Natzweiler, Groß-Rosen, Stutthof*. Munich: Beck 2007, pp. 278-282; This: Dyhernfurth II. in: Benz / Distel (eds.): Der Ort des Terrors, vol. 6, pp. 282-286; Isabel Sprenger: *Gross- Rosen. A concentration camp in Silesia.* Cologne: Böhlau 1996, p. 236ff; Andreas Weigelt: Briesen/Falkenhagen. In: Benz / Distel (eds.): *Der Ort des Terrors. Vol. 3.Sachsenhausen, Bu- chenwald*. Munich: Beck 2006, pp. 137-141; Gabriele Hammermann: Gendorf. In: Benz / Distel (eds.): *The Place of Terror. Vol. 2. early camps, Dachau, Emslandlager*. Munich: Beck 2005, pp. 333-336.

[79] As a result, the I.G. Farben's Abwehr department's prohibition against using prisoners in secret production facilities were disregarded. The Dyhernfurth case shows that and how the security police regulations became increasingly macu- lated due to the labor shortage.

However, as they were urgently needed for the maintenance of the transfer facilities, most of them survived, despite frequent mistreatment and the rigorous demarcation of their camp grounds from the rest of the factory site by a death strip, which left them particularly vulnerable to the arbitrariness of the SS guards.

In the summer of 1943, however, Luranil Baugesellschaft also became active at the Briesen-Falkenhagen site, where it took over part of the construction project previously operated by the Waffen-SS to build a production facility for incendiary projectiles ("N-Stoff") and pushed ahead with the construction of the large-scale plant for the production of the poison gas sarin ("Sarin II"). After the construction of a satellite concentration camp, the commandant's office of Sachsenhausen concentration camp provided the first 100 construction prisoners in October 1943, and in the course of 1944 an average occupancy of 600 concentration camp prisoners was reached to supplement the approximately 800 Polish and Soviet forced laborers. For the construction of its plants for the production of the weapons of mass destruction Tabun and Sarin, I.G. Farben rented a total of at least 4,750 prisoners from the SS in order to achieve average staffing levels of 3,000 (Dyhernfurth construction site), 600 (Falkenhagen construction site), 250 (Tabun filling and loading station) and 200 (Gendorf) in the ongoing exchange of those who had become unfit for work for unused slave laborers[80] at the construction sites and in the Tabun plant.

In this arcane area of the construction projects for the production of weapons of mass destruction, the management of I.G. Farben also tested techniques for the use of prisoners that went beyond the methods practiced in the Auschwitz project of utilizing the prisoner construction workers. Although the "smelting Jews" avoided for the Dyhernfurth site had already been expressly stripped of all protective provisions under labor law in the leasing contract, after their complete conversion into unpaid work machines they were used together with the construction and production prisoners obtained from Gross-Rosen.

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[80] On the definition of slave labor as the most radical variant of unfree labor, see Roth: Unfreie Ar- beit; for additional information on the current state of the research discussion on the question of the extent to which concentration camp prisoners were slaves, see Marc Buggeln: Were Concentration Camp Prisoners Slaves? The Pos- sibilities and Limits of Comparative History and Global Historical Perspectives. In: *International Review of Social History* 53 (2008), pp. 101-129.

The company was subject to exploitation criteria in which efficiency aspects played an increasingly important role. In Dyhernfurth, the Luranil construction company coordinated the activities of around 30 small subcontractors. In order to increase the performance of the prisoners handed over to them, the daily rental fees to be paid to the SS were varied individually and coupled with the granting of bonuses, which amounted to a kind of payment in kind at the lowest level. The experience gained in this way was considered favorable and, in the course of 1944, also became established at other locations where I.G. Farben exploited prisoner slaves on its construction sites. The fact that the Luranil construction management of Dyhernfurth and not I.G. Auschwitz deviated from the usual leasing scheme for the first time was certainly also due to the fact that the slightly increased labor costs resulting from this experiment were not charged to the central accounting department of I.G. Farben, but to the Reich-owned Montan GmbH.

In the third phase of forced labor deployment, such approaches to the "valorization" of concentration camp prisoners was not to be found at I.G. Farben, although in individual cases there was relevant experience with the leasing practices of the Schmelt organization.[81] This was possibly due to the fact that the I.G. Farben explosives group led by Dyna- mit AG and Westfälisch-Anhaltische Sprengstoff AG (WASAG) and its subsidiaries only began using concentration camp prisoners at the filling stations, in the nitrocellulose and primer production plants and in their construction detachments from June/July 1944 onwards. All the more relentlessly, however, they then laid their hands on the last labor reserves still available in the concentration camps and had thousands of Hungarian Jewish women who had just been deported to the Reich fed into them. From the fall of 1944, there were at least twelve more subcamps in the shrinking territory of the Nazi dictatorship, whose inmates were exploited in alternating twelve-hour shifts in the DAG and WASAG factories in Allendorf, Bromberg-Brahnau, Christianstadt, Elsnig, Glöwen, Hertine, Hessisch-Lichtenau, Landsberg am Lech, Ludwigsdorf, Malchow, Piontki and Riedsloh.[82] Mostly without gas masks and hand protection

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[81] Cf. Steinbacher: "Musterstadt" Auschwitz, p. 138ff.

[82] Cf. Benz / Distel (eds.): *The Place of Terror. History of the National Socialist concentration camps.* Munich: Beck 2005 (vol. 2), 2006 (vol. 3), 2007 (vol. 5). This contains information on the following DAG and WASAG companies that exploited forced laborers,

In the often highly mechanized filling plants, they had to stir the explosives TNT, dinitrobenzene, picrin and nitropenta into bomb and grenade casings, assemble detonator caps, operate the nitrocellulose plants or perform physically hard work in wooden clogs and ragged clothes in the construction camps. As there was no longer any exchange of workers who were no longer fit for work with the main camps, apart from the additions from the disbanded Jewish forced labor camps, the subcamps intended for the DAG and WASAG companies received large one-off allocations of up to 1,000 prisoners, many of whom died as a result of the extremely unhealthy work, hunger and cold. In total, the I.G. Farben explosives group was provided with at least 8,900 prisoners by the concentration camps for its production programmes, which were rigorously maintained until the evacuation or the Allied invasion. The majority were Hungarian and Polish Jewish women, but there were also smaller groups of Jewish women from Germany, Austria and Western Europe, as well as Polish men who had been taken over by the Schmelt organization. Around 1,500 of them perished from the privations and hardships.

However, access to concentration camp inmates was by no means the exclusive domain of the "Ostwerke", the chemical weapons sector and the explosives group of I.G. Farben. As early as the spring of 1943, the first imitators were found in a central German parent plant.[83] The management of the Wolfen film factory urgently needed female workers to maintain the production of artificial silk and rayon. Since April 1943

Brief reports: Allendorf (vol. 3, pp. 360-362), Bromberg-Brahnau (vol. 5, pp. 541-543), Christianstadt (vol. 5, pp. 270-275), Elsnig (vol. 3, pp. 425-426, Gläwen, (vol. 3, pp. 194-197), Hessisch-Lichtenau (vol. 3, pp. 460-462), Landsberg am Lech (vol. 2, pp. 378-380), Ludwigsdorf (vol. 5, pp. 383-385) and Riedsloh (vol. 3, pp. 470-472).

See also the monographic studies by Bernd Klewitz: *Die Arbeitssklaven der Dyna- mit Nobel*. Schalksmühle: Engelbrecht 1996; Dieter Vaupel: *Spuren die nicht vergehen. A study on forced labor and compensation*. Kassel: Gesamthochschul-Bibliothek 1990. Vaupel was able to evaluate compensation documents from Frankfurter Compensation Treuhand GmbH and also prove that Jewish concentration camp prisoners were exploited in three other DAG and WASAG explosives factories, namely in Malchow, Hertine and Piontki.

[83] On this and the following, see SfS Archive, I.G. Farben trial, ADB 69; BAL, 265-53, I.G. personnel statistics, list of the Dr. Bertram office dated 8.1.1945; Früholz: System der Zwangsarbeit, p. 137ff.; Irmgard Seidel: Wolfen. In: Benz / Distel (eds.): Der Ort des Terrors, vol. 3, pp. 618-621; Sabine Schalm: München (Agfa Kamerawerke). In: Benz / Distel (eds.): Der Ort des Terrors, vol. 2, pp. 396-398; Bernhard Strebel: *Das KZ Ravensbrück. The history of a camp complex.* Paderborn: Schöningh 2003, pp. 419ff., 436ff.

They worked with the SS Economic and Administrative Main Office. At the beginning of May, Ravensbrück concentration camp set up a satellite camp in Wolfen, the administration of which was later taken over by the commandant's office of Buchenwald concentration camp, and the first 250 women and girls, mostly Polish and Soviet political prisoners, arrived in Wolfen in mid-May 1943. Following the adoption of the Ravensbrück bonus system and the stricter discipline associated with it, the technical department directorates were satisfied with the services provided and ordered further supplies from Ravensbrück, increasing the number of concentration camp prisoners to 425. In September 1944, the management of the Munich Agfa camera factory also procured 500 female prisoners from the Dachau concentration camp, which they housed in a nearby block of flats and used to produce small parts. In both cases, the women and girls suffered deprivation due to strenuous work, hunger and cold. However, they were generally not mistreated or exploited to the point of physical collapse, so there was no need to exchange them for fellow sufferers who were fit for work. Things were quite different at the Leuna plant:[84] In the autumn of 1944, the Gestapo procured 2,000 prisoners from the Central German "work education camps" and used their columns with brutal methods to rebuild the plant facilities, which had been repeatedly attacked by the Allied bombers, wherever extremely heavy and life-threatening work had to be done. Little is known about their fate. Most of the deaths apparently occurred during the recovery and defusing of unexploded bombs, which they were forced to do after a short training phase.[85] In contrast, there were far fewer deaths at an alternative site for the synthesis of aviation fuel in Waldenburg in Lower Silesia, which was set up in October 1944 by the "Schmelt Organization", which was in the process of being disbanded. 650 Jewish forced labourers were deployed there.

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[84] Karl-Heinz Streller / Erika Maßalsky: *Geschichte des VEB Leuna-Werke "Walter Ulbricht" 1916 bis 1945.* Leipzig: Deutscher Verlag für Grundstoffindustrie 1989, p. 190f.

[85] Prison companies were formed from the prisoners of the labor education camps and deployed in the Leuna factories. This resulted in the deaths of 139 inmates of the AEL Seegau alone. Cf. Streller / Maßalsky: History of VEB Leuna-Werke, p. 190.

were transported to a newly built camp and placed under the command of the Gross-Rosen concentration camp.[86]

At least 23 locations of the I.G. Farben Group and the affiliated companies controlled by it, a total of

51,445 concentration camp and Gestapo prisoners were deployed and exploited under extreme conditions. At least 16,570 prisoners (32.2 percent) perished or were killed in the process. In the fall of 1944, the number of workers in the approximately 100 I.G. Farben plants under construction or in production reached its peak. At this time, these plants and the camps reserved exclusively for the I.G. Farben labor detachments contained

24,050 concentration camp and Gestapo prisoners.

It is not easy to assign these figures to the total workforce and to obtain information about the proportion of prisoner workers. The research literature usually refers to the personnel statistics of the Technical Committee, which put the total workforce of the Group at 180,800 men and women on October 1, 1944, with the proportion of Germans at 97.500 (53.9 percent), foreign workers at 62,800 (34.29 percent, of which 46,100 were men and 16,700 women), temporary workers, forced laborers, Wehrmacht prisoners and concentration camp inmates at 10,900 (6.03 percent) and prisoners of war at 9,600 (5.32 percent).[87] However, this compilation is quite problematic. It is revealing that the German core workforce only made up just over half of the total workforce, while the foreign forced laborers (foreign workers and prisoners of war, not including prisoners) accounted for 39.6 percent and the "marginal workforce" sector had increased to a total of 46.1 percent with the inclusion of prisoner workers. However, the list obscures the actual number of prisoners by compiling it with the temporary workers, most of whom were classified as foreign workers. In addition, the workforce overviews of the Technical Committee consistently included only 46 of the approximately 100 large and medium-sized I.G. plants and associated companies. As the study of the data collected by the

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[86] Barbara Sawicka: Waldenburg (Walbrzych). In: Benz / Distel (ed.): Der Ort des Terrors, vol. 6, pp. 449-452.

According to the data provided by the Central Bureau of Personnel Statistics,[88] the companies of Anorgana GmbH, Fürstengrube GmbH, Sprengstoffgrube, Bergbauverwaltung, Donau Chemie AG, im General- gouvernement and several other affiliated companies controlled by I.G. Farben were missing from the list. Although some of them were still under construction towards the end of the war, they contributed around 20 percent of I.G. Farben's total turnover. As a result, their workforces were relatively larger and can be estimated at at least 25 percent of the total workforce reported in the Bertrams statistics. Furthermore, it can be assumed that the proportion of forced laborers, prisoners of war and concentration camp inmates was particularly high in this sector of I.G. Farben, which was not included in the statistics. It can be estimated at an average of 65 percent, whereby we can include the proportion of concentration camp prisoners already examined in concrete figures. Taking these minimum assumptions into account, we arrive at the following results: On October 1, 1944, I.G. Farben management had a workforce of 226,000 men and women. Of these, 113,320 (50.14 percent) belonged to the German core labor group. The proportion of concentration camp and Gestapo prisoners amounted to 23,895 (10.57 percent). 88,785 construction and operating workers were foreign forced laborers and prisoners of war, accounting for 39.29 percent of the total workforce.[89]

I.G. Farben and the Zyklon B

Around 11,600 labor slaves from the I.G. Farben plant in Auschwitz and its Upper Silesian mining operations were selected after exhausting their work capacity, taken back to the main camp and the majority of them murdered in the gas chambers of Auschwitz-Birkenau. The management of the concentration camp had derived the technology of the killing process from a procedure for decoding the concentration camp barracks and the prisoners' clothing, into which they had incorporated a

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87 SfS Archive, I.G. Farben Trial, ADB 68, Doc. NI-3763 and NI-11412.

88 Office of Dr. Bertrams, personnel statistics, monthly overviews of the movement of the workforce, overview as of 1.9.1944/1.10.1944. BAL, 265-53.

89 Unfortunately, a further differentiation that also takes into account the proportions of temporary workers, contract workers, German conscripts and Wehrmacht prisoners must be omitted in this overview.

The gas chambers at Auschwitz-Birkenau were a further development of Degesch's closed-circuit chambers for delousing clothing, as it had been known since the Second World War that Blaus was a good delouser.[90] The gas chambers at Auschwitz-Birkenau were a further development of Degesch's circulation chambers for delousing clothing, as it had been known since the First World War that hydrogen cyanide also kills people if they are exposed to it in closed rooms. They were disguised as shower rooms in order to keep the victims in the dark about their impending death until the last moment. After the prisoners had been locked in, the poison gas, dissolved in diatomaceous earth and packed airtight in a tin can, was let into the chamber through an opening in the ceiling. It was identical to Zyklon B, the cyanide (hydrogen cyanide, HCN) used as an insecticide, but did not contain the odor warning agent that was added to the usual batches. It immediately went into the gas phase and killed the occupants of the chamber in an agonizing manner within a few minutes. The victims were then incinerated in one of the neighboring crematorium ovens. From July 1943, the management of Degesch supplied the Hygiene Institute of the Waffen SS and the commandant's office of the Auschwitz concentration camp directly with Zyklon B cans, bypassing their previous authorized dealer, the Hamburg trading company Tesch & Stabenow.

I.G. Farbenindustrie AG had held a stake in Degesch since 1930 together with the Degussa Group and Th. Goldschmidt AG. Like Degussa, it held 42.5 percent of the share capital in this joint development and distribution company for gaseous insecticides and, like Degussa, was represented by three managers on the seven-member management committee: Phillip Heinrich Hörlein (1882-1954)[91] , Carl Wurster (1900-1974)[92] and Wilhelm R.

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[90] Cf. on this and the following SfS Archive, I.G. Farben trial, ADB 82 and 83; Angelika Ebbinghaus; Der Prozeß gegen Tesch & Stabenow. From Pest Control to Holocaust. In: *1999. Zeitschrift für Sozialgeschichte des 20. und 21. Jahrhunderts* 13 (1998), H. 2, pp. 16-71; Peter Hayes: *Degussa in the Third Reich. From cooperation to complicity.* Munich: Beck 2004, pp. 283ff; Jürgen Kalthoff / Martin Werner: *Die Händler des Zyklon B.* Hamburg: VSA 1999; Hervé Joly: L'implication de l'industrie chimique allemande dans le Shoah. Le cas de Zyklon B. In: *Revue d'histoire moderne et contemporaine* 47 (2000), H. 2, pp. 368-400.

[91] For Philipp Heinrich Hörlein, see the biographical entry at http://www.wollheim-memorial.de/en/philipp_heinrich_hoerlein_18821954.

Mann (1894-1992)[93] , head of sales at the pharmaceutical and crop protection division of

I.G. Farben, who also acted as Chairman. In contrast, management was in the hands of Degussa manager Gerhard Friedrich Peters (1900- 1974). The company was housed in the Degussa administration building and was also closely linked to Degussa in terms of personnel and accounting. It was therefore a holding company in which the

I.G. Farben was heavily involved, but did not hold a dominant position. In this case, Degussa was undoubtedly *primus inter pares.*

Around one million people fell victim to the use of the dual chemical weapon Zyklon B in the mass murders carried out by the SS behind the front lines of the Second World War,[94] including most of the 11,600 selected "unfit for work" at the I.G. Farben Auschwitz plant and Fürstengrube GmbH. What did the managers of I.G. Farben know about this? This question is still hotly disputed today. In the

I.G. Farben process, Mann, Hörlein and Wurster could not be proven to have been informed about the "dual" use of their investment product in their capacity as members of the management committee, because this had not noticeably increased the volume of deliveries. However, this overlooked the fact that the people involved in Degesch, including its administrative committee members, had a common horizon of experience dating back to the First World War, as Degesch had emerged directly from the Kaiser Wilhelm Institute for Physical Chemistry, where intensive research had been carried out into the chemical weapon prussic acid and its use in enclosed spaces (bunker positions). It was also overlooked that there was a second source of information for the I.G. Farben managers.

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92 For Carl Wurster, see the biographical entry at http://www.wollheim-memorial.de/en/carl_wurster_19001974.

93 For Wilhelm Rudolf Mann, see the biographical entry at http://www.wollheim-memorial.de/en/wilhelm_rudolf_mann_18941992.

94 Contrary to the prevailing historiographical interpretation, I do not believe that the term "mass destruction" should be limited to the mass killing of combatants, because this does not do justice to the "totalization" of warfare in the 20th century, which included in particular the use of weapons of mass destruction against soldiers *and the* civilian population. The highly volatile poison gas hydrocyanic acid (HCN) was developed during the First World War by the German pharmacologist Ferdinand Flury at the Kaiser Wilhelm Institute for Physical Chemistry for use in enclosed spaces (e.g. bunker shelters), and he held a patent on it until the early 1930s. After the war, it was then further developed as a "dual" insecticide by Degesch and commercialized under the trade name Zyklon. The gruesome re-conversion into the original chemical weapon in the SS extermination camps began in the fall of 1941.

The close connection between the Auschwitz-Monowitz construction plant and the Auschwitz concentration and extermination camp just 6 km away, for whose expansion the senior managers of the Upper Rhine Group personally lobbied the construction, barrack and iron allocation authorities in 1941/42.[95] In addition, many I.G. Farben managers traveled to the emerging eastern center of high-pressure synthesis, where they were also informed about the close cooperation with the central construction management of the concentration camp, and the management of the "Buna IV" project, who came from Ludwigshafen and Leuna, went in and out of the main camp. We can therefore safely assume that at least the top managers of the company and the exponents of the Oberrhein Group knew what was happening to the labor slaves of their large-scale construction project who were transported back to Auschwitz:[96] They were killed with a "dual" chemical weapon, which I.G. Ludwigshafen had been involved in developing from the very beginning.[97] Almost all of them accepted this crossing of the line into a crime against humanity and remained silent about it for the rest of their lives. To this day, only one senior employee is known to have drawn the consequences of what he saw and learned. It was Hans Deichmann (1907-2004), an I.G. Farben authorized signatory who was assigned to the Italian office of the General Plenipotentiary for Special Issues in Chemical Production[98] . After his second visit to the I.G. Farben plant in Auschwitz, he sabotaged the further deportation of Italian workers to Upper Silesia and *joined* the Resistenza group *Giustizia e Libertà*.[99]

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[95] Florian Schmaltz: The IG Farben Industry and the Expansion of the Auschwitz Concentration Camp 1941-1942. in: *Sozial.Geschichte. Zeitschrift für historische Analyse des 20. und 21 Jahrhun- derts* N.F. 21 (2006), H. 1, pp. 33-67.

[96] Statements by employees of the I.G. Farben factory in Auschwitz about their knowledge of the gassings with Zyklon B can be found in Bernd C. Wagner: Rumors, Knowledge, Repression. IG Auschwitz and the Birkenau extermination camp. In: Norbert Frei / Sybille Steinbacher / Bernd C. Wagner (eds.): *Exploitation, extermination and the public. New studies on National Socialist camp policy.* Munich: Saur 2000, pp. 231-248.

[97] Raymond G. Stokes: From I.G. Farbenindustrie AG to the reestablishment of BASF (1925-1952). In: Werner Abelshauser (ed.): *Die BASF. A Corporate History.* Munich: Beck 2002, pp. 221-358, here p. 329.

[98] For Hans Deichmann, see the biographical entry at http://www.wollheim-memorial.de/en/hans_deichmann_19072004.

[99] SfS Archive, Hans Deichmann Collection, no. 4, 5, 12; Hans Deichmann: *Oggetti - Gegenstände.* Milan: All'insegna del pesce d'oro di Scheiwiller 1995.

The pharmaceutical division of I.G. Farben during the war and its involvement in medical crimes

During the Second World War, I.G. Farben's pharmaceutical division also experienced a significant upswing.[100] Although it lost large parts of its overseas markets from September 1939, this setback was more than compensated for by the sharp rise in demand from the Wehrmacht. The medical parks of their units and the Waffen-SS obtained almost 60 percent of all medicines, vaccines and serums from the central pharmaceutical sales association of I.G. Farben in Leverkusen. Many medicines and vaccines were now also "important to the war effort", and the key figures in the pharmaceutical sector, namely sales manager Wilhelm R. Mann, the head of the main pharmaceutical conference and plant manager of Elberfeld Heinrich Hörlein, the Hoechst plant manager Carl Ludwig Lautenschläger (1888-1962)[101] and the leading managers of the Behringwerke department in Marburg, Richard Bieling (1868-1967) and Albert Demitz, became influential players in military pharmacy and disease control.

However, this gain in prestige only had a limited effect within the company. After all, the Technical Committee relaxed its traditionally restrictive attitude towards investment and development projects in the pharmaceutical sector, but the funding allocations remained modest in comparison to the large wartime economic projects of the "GBChem sector".[102] Only the Behring plants were allocated larger investment funds to enable their managers to access the serum and vaccine institutes in the occupied territories. In addition, in December 1940, in cooperation with the Univer

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[100] For the following sections, see SfS Archive, I.G. Farben Process, ADB 84 and 87; Stephan H. Lindner: *Hoechst. An I.G. Farben plant in the Third Reich.* Munich: Beck 2005, pp. 319ff; Froben Homburger: *Die Behringwerke von 1929 bis 1945 - Eine Fallstudie zum Verhältnis von Industrie und Staat im Nationalsozialismus.* Diploma thesis, University of Marburg 1993; Ludger Weß: Menschenversuche und Seuchenpolitik. Two unknown chapters in the history of German tropical medicine. In: *1999. Zeitschrift für Sozialgeschichte des 20. und 21. Jahrhun- derts* 8 (1993), H. 2, pp. 10-50; Paul Julian Weindling: *Epidemics and Genocide in Eastern Europe, 1890-1945.* Oxford: Oxford UP 2000, pp. 271ff., 322ff.

[101] For Carl Ludwig Lautenschläger, see the biographical entry at http://www.wollheim-memorial.de/en/carlludwig_lautenschlaeger_18881962.

[102] For example, the share of Division II's pharmaceutical sector in fixed asset investments fell from 2.8 percent in the years 1925-1932 to 0.9 percent in the period 1941-1944. cf: I.G. Farbenindustrie AG, p. 593, Table: Distribution of fixed asset investments among work areas.

A Behring Institute for Experimental Therapy was founded at the University of Marburg, which supplemented the previous collaboration with the state research institute in the field of sera and vaccines, which had already existed for some time in Frankfurt am Main. Exactly two years later, a Behring Institute for typhus research was finally opened in Lemberg (Lviv), for the establishment of which the Technical Committee had approved RM 1 million. In this way, the Behring factories brought many private and public production facilities for vaccines and serums that had come under German control under their control and integrated them into a Europe-wide production network, exploiting thousands of forced laborers, some of whom were highly qualified.[103] In addition to conscripted German women, over 100 mostly Polish forced laborers were also deployed at the Marburg Behringwerke from autumn 1942. However, the strategists of the pharmaceutical division did not succeed in completely monopolizing the development and production sector for combating epidemic infectious diseases, which was considered particularly promising for growth and profit in German-ruled Europe.

This recourse to external material and human resources was not only unscrupulous, but to a certain extent also a kind of flight forward. Although I.G. Farben's pharmaceutical managers expressly welcomed the monopolization of the key sectors of their division within the company, the priority given to the high-pressure and basic materials sectors meant that they were not equipped with the resources required for a successful approach. Although pharmaceutical sales more than doubled compared to the prosperous years in Weimar, development and plant investments for pharmaceuticals, vaccines and serums were still in the lower ranks despite the expansion of the Behring plants and the establishment of the research center in Lviv. Added to this was the increasing cost pressure, because in contrast to the monopolized basic material areas of war production, the Group's pharmaceutical group did not have a dominant market position despite its enormous share in supplying the public demand monopolists. Therefore, every

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[103] On this and the following, see Thomas Werther: Menschenversuche in der Fleckfieberforschung. In: Angelika Ebbinghaus / Klaus Dörner (eds.): *Vernichten und Heilen. The Nuremberg Doctors' Trial and its Consequences.* Berlin: Aufbau 2002, pp. 152-173; Weindling: Epidemics and Genocide, pp. 333ff.

The opportunity to minimize development and production costs should be seized as soon as it arises.

Due to their less privileged economic position, the pharmaceutical managers at Elberfeld-Leverkusen, Hoechst and Marburg had always looked for particularly cheap ways to introduce new drugs. This applied above all to the release and distribution of substances newly developed in the laboratories and tested in the first series of animal experiments for clinical trials. The medical ethical problems of this particularly sensitive phase in the development of new remedies were never taken seriously by the medical managers at I.G. Farben. The regulations on human trials issued in 1931 also failed to change their thinking, as they increased development costs and considerably prolonged the time to market. From the 1920s onwards, the pharmacists and physicians at I.G. Farben had their first synthetic malaria drugs tested in numerous psychiatric institutions, children's homes and prisons.[104] They used their relationships with German military advisors and intervention troops to have their gas-burning serums tested in low-cost mass experiments in the theaters of war in the 1930s - in Spain and China. This was followed in the late 1930s by trials to test the efficacy and tolerability of the new vaccines against diphtheria and scarlet fever in several educational institutions in the Rhineland, a new combination vaccine against tetanus, typhoid and paratyphoid in the Neuss sanatorium and nursing home and a new group of vaccines against dysentery and intestinal parasites in several Hessian prisons and sanatoriums and nursing homes. But that was just the tip of the iceberg. There were a few institutions, including the Eichberg sanatorium and nursing home in Rheinhessen and the Frankfurt clinic for the mentally ill, in which the chemical-pharmaceutical departments of Elberfeld-Leverkusen and Hoechst had entire classes of substances tested for their tolerability, mode of action and indications over a series of years. In no case were the test subjects or their guardians asked for their consent and informed of the results.

experiments and their risks. At the beginning of the war, the sero-bacteriological and chemical-pharmaceutical departments of I.G. Farben thus had an extensive network of contract doctors who worked in asylums, psychiatric institutions and prisons and earned extra money by abusing inmates as involuntary test subjects.[105]

This lack of any medical ethical barriers and controls meant that the I.G. Farben medical managers responsible for the clinical testing of the newly presented remedies could become accomplices to Nazi medical crimes without realizing the illegality of their actions. In addition, they were almost all self-confessed Nazis and denied their "experimental material", which was becoming increasingly widespread in prisons and concentration camps, basic human rights anyway. Above all, however, the war justified a further shortening of the development stages from laboratory product to new remedy or vaccine in the service of protecting the "German soldier" and his "home front" from epidemics and damage to health. As a result, the crossing of borders was pre-programmed. The actors underwent a multi-stage radicalization process that did not even allow them to shy away from personal co-responsibility for ex- perimental medical acts of killing. In Elberfeld- Leverkusen, Anton Mertens, the head of the Scientific Commission, Karl König, the subordinate head of the Pharmaceutical Research Department, Walter Kikuth (1896-1968), the director of the Institute for Chemotherapy, and the sales directors Gerhard Zahn and Heinrich Neumann were the most important decision-makers, who coordinated with their superiors Heinrich Hörlein and Wilhelm R. Mann in the closest circle. Mann in the closest circle. The Hoechst decision-making committee for the release and distribution of a preparation for clinical trials consisted of the head of the pharmaceutical office Julius Weber (1896-1960), the director of pharmaceutical research Max Bockmühl (1882-1949) and his colleague Rudolf Fußgänger (born 1901), while the plant manager Carl-Ludwig Lautenschläger, like Hörlein

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[104] Cf. on this and the following Lindner: Hoechst, p. 322ff.; Ernst Klee: *Auschwitz, die NS- Medizin und ihre Opfer*. Frankfurt am Main: Fischer 1997, p. 301ff; Weß: Menschenversuche und Seuchenpolitik, p. 10-50.

[105] This network of investigators in the pharmaceutical departments of I.G. Farben also included Friedrich Mennecke, the later expert witness of the psychiatric murder operation "T 4", see Klee: Auschwitz, die NS-Medizin und ihre Opfer, p. 302f.; supplementary Lindner: Hoechst, p. 325ff.

in Elberfeld had the final say. If, on the other hand, decisions in the field of vaccines and serums were up for debate, Hörlein and Lautenschläger also consulted the top managers of Behringwerke Richard Bieling and Albert Demitz as well as the later head of the Lemberg Behring Institute Richard Haas (1910-1988), who had previously been an employee of the Marburg Institute for Experimental Therapy.[106]

Since the beginning of the war, the network of corresponding experimental physicians at I.G. Farben changed in a remarkable way.[107] Its strongest support came from some medical-scientific employees of all ranks who took over functions in the Wehrmacht's medical service and began to test the entire spectrum of new developments in their new environment, such as the Marburg plant manager Richard Bieling, who, as a consultant hygienist to a tank army, constantly sent in test reports on new drugs and vaccines. In other cases, however, the managers of the pharmaceutical division also lobbied for their cooperation partners to be released from military service because they considered the continuation of their test series at the previous locations to be indispensable; for example, the psychiatrist Friedrich Mennecke (1904-1947) also had the intercession of his employers in Hoechst to thank for the fact that - in addition to his "state political duties" as an actor in psychiatric murders - he was able to return to the Eichberg institution and continue his malaria and paralysis experiments there. Other honorary employees joined the Waffen SS and began a career as a concentration camp doctor. Among them was Hellmuth Vetter (1910-1949), who, after starting work in the Dachau concentration camp in August 1941, was initially assigned to the clinical testing of I.G. Bayer's sulphonamides on seriously ill prisoners and remained active in several concentration camps as a much sought-after and well-paid investigator until the end of the war. The pharmaceutical departments of Bayer, Hoechst and Marburg also established new contacts with site and camp doctors in the concentration camps. As early as November 1939, after the outbreak

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[106] On the senior staff of the pharmaceutical departments, see SfS Archive, I.G. Farben-Process, ADB 84; Lindner: Hoechst, p. 319ff.

[107] Cf. on the following SfS Archive, I.G. Farben trial, ADB 87; Klee: Auschwitz, die NS-Medizin und ihre Opfer, p. 279ff.; Weß: Menschenversuche und Seuchenpolitik, p. 10ff.; Ulrich Schneider / Harry Stein: *IG-Farben AG, Abt. Behringwerke Marburg - KZ Buchenwald - Menschenversuche. A documentary report.* Kassel: Brüder-Grimm-Verlag 1986.

In the course of a rest epidemic in the Polish special camp of the Buchenwald concentration camp, they were provided with a vaccine that had not yet been clinically tested, which they had tested in comparison with their standard commercial preparation. Contact with the archipelago of concentration camps has continued ever since. After the founding of the Hygiene Institute of the Waffen SS, it developed into a permanent relationship. Joachim Mrugowsky (1905-1948), the director of the institute, became a close cooperation partner of Hoechst, Elberfeld and Marburg, and repeatedly championed the interests of I.G. Farben in the race for new drugs and vaccines.[108]

Many of I.G. Farben's SS medical cooperation partners paid for their medical crimes with their lives, whereby the human experiments on concentration camp prisoners for which they were responsible contributed significantly to the condemnations of the Allied military courts. Their clients, on the other hand, remained unmolested or got off lightly. In the I.G. Farben trial, the judges accepted the claims of the three accused main exponents of the pharmaceutical division, Hörlein, Lautenschläger and Mann, that they had not been informed that many of the victims had been deliberately infected beforehand and had not survived the experiments. What was it really like? In their perception, were the concentration camp human experiments really within the methods they had been practising for decades of abusing involuntary and uninformed test subjects, or were they accomplices who deliberately included the killing of concentration camp prisoners in their calculations because they wanted to shorten, simplify and cheapen the clinical testing procedures once again? For this was the qualitative leap that clearly distinguished the cooperation of the I.G. Farben pharmaceutical sector with the concentration camp doctors from the series of trials carried out on a massive scale since 1940/41 by their fee-based contract doctors with the Wehrmacht, the medical administrations and the special clinics, such as the Hamburg Institute for Tropical Medicine, with sick Eastern European forced laborers and Soviet prisoners of war. This question will be briefly discussed using the example of the typhus experiments.[109]

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[108] Weindling: Epidemics and Genocide, pp. 246ff., 352ff.

[109] SfS Archive, I.G. Farben Trial, ADB 84-87; SfS Archive, Nuremberg Doctors' Trial, ADB 12, VDB Waldemar Hoven, Joachim Mrugowsky and Gerhard Rose, reproduced in: *Der Nürnberger Ärzteprozeß 1946/47. Wortprotokolle, Anklage- und Verteidigungsmaterial, Quel- len zum Umfeld, Mikrofiche-Edition*, commissioned by the Stiftung für Sozialgeschichte des 20. Jahrhunderts ed. by Klaus Dörner / Angelika Ebbinghaus / Karsten Linne. Munich: Saur 2000,

For the epidemic experts at I.G. Farben, typhus research was also new territory, although the rickettsial infection transmitted to humans by the bite of the clothes louse had been feared as a particularly dangerous disease since the First World War. It was not until 1938 that they began work in this field in Marburg. By the beginning of the war, Behringwerke had registered a vaccine obtained from horse serum as well as a vaccine developed by Richard Otto and Rudolf Wohlrab from the Frankfurt Institute for Experimental Therapy, in which the rickettsial cultures had been grown on mouse lungs. When Wohlrab took over the typhus department of the State Institute of Hygiene in Warsaw after the occupation of Poland, he had the two vaccines tested on ghettoized Jews, but was unable to produce any conclusive results due to the long epidemiological observation period of this first group experiment. On the other hand, the experiments started at the same time by Walter Menk, a tropical medicine specialist from Hamburg who was also working in Warsaw, who tested the effectiveness of around 100 preparations from the I.G. Farben chemotherapeutic range on typhus patients, were clearly negative. The management of Behringwerke therefore had to state in a leaflet published in the summer of 1940 that there was neither an effective mass vaccine for preventive protection nor effective drugs for the treatment of typhus. The only promising method of preventing the disease was the delousing process, for which I.G. Farben, together with Degussa and Th. Goldschmidt AG, had the "dual" prussic acid preparation Zyklon B available.

In the course of 1941, the epidemic situation worsened dramatically. The ghettoization of the Polish-Jewish population provoked severe typhus epidemics in the Generalgouvernement from the spring onwards. In July 1941, outbreaks of epidemics followed in some concentration camps, and a few months later mass deaths began in the camps for Soviet prisoners of war. After the failure of the "blitzkrieg" against the Soviet Union, typhus finally reached the German armies outside Moscow. The situation became critical and could only be prevented by extreme quarantine measures and the

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Fiches No. 140, 260-263, 265-277, 288-291; Weindling: Epidemics and Genocide, pp. 333ff., 352ff.; Werther: Menschenversuche.

The disease was brought under control with the construction of a delousing sluice on the eastern border of the Reich. A feverish search began for an effective measles vaccine and for potent drugs to treat the severe disease, which claimed the lives of an average of 30 percent of those infected, while the survivors often suffered severe permanent damage. Until then, there had only been one reasonably well-tested vaccine, developed by the Polish-Austrian microbiologist Rudolf Weigl in the early 1930s. Rickettsia cultures grown in the intestines of infected lice were processed into vaccines. After infection, the lice strains had to be fed for a week by immunized human "lice feeders", who had thousands of lice placed in boxes on their thighs two to three times a day. Due to the close contact with the pathogens and the lice, this procedure was extremely dangerous, complicated and costly. It was out of the question for the mass production of vaccines. Since the beginning of the war, the Allies therefore developed an alternative breeding method that used the yolk sacs of chicken embryos to enrich the rickettsia cultures, worked continuously and was suitable for the large-scale mass production of vaccines due to the lack of human contact with the disease carriers (Cox vaccine).

From the turn of the year 1940/41, a race for a copy of the Cox vaccine began in Germany, in which the Behringwerke participated alongside the Warsaw branch of the Frankfurt Institute for Experimental Therapy (Rudolf Wohlrab) and the Robert Koch Institute in Berlin. The first egg vaccine from the Behringwerke department of I.G. Farben was already available in the spring of 1941 and, like its predecessors, was immediately tested in the Warsaw ghetto together with the Wohlrab vaccine. Nevertheless, I.G. Farben did not win the race, as the army high command had founded its own typhus institutes in Krakow and Lviv shortly after the occupation of Poland, which were committed to the Weigl method under their directors Hermann Eyer (Krakow) and Rudolf Weigl (Lviv). This did not change when it became clear that the two institutes were not even able to come close to covering the Wehrmacht's own acute need for vaccines. The I.G. Farben managers were therefore left with the option of developing their mass production process by founding their own research and production company.

center in Lviv (Lemberg). In the fall of 1941, they finally succeeded in winning over the Hygiene Institute of the Waffen-SS, the government of the General Government and the Wehrwirtschafts- und Rüstungsamt of the OKW for their competition project.

But even now, the path to a solution based on the Allied standards was not yet clear, as the camp of supporters of the Cox vaccine was by no means united, and the research team at the Robert Koch Institute in particular opposed the Behringwerke's claim to leadership. At the end of December 1941, it was therefore decided in two consecutive meetings of the top health authorities to test all competing procedures with regard to their efficacy and tolerability in human trials. A facility of the Hygiene Institute of the Waffen SS in the Buchenwald concentration camp was selected as the test center, which was headed by a concentration camp doctor named Erwin Ding (1912-1945), who was quite inexperienced in the field of typhus research. The decision was immediately put into practice. Ding infected the first concentration camp prisoners with rickettsial cultures grown on chicken embryos from the Robert Koch Institute at the beginning of January 1942, and shortly afterwards 135 other healthy prisoners were vaccinated with the vaccines available, including two variants from Behringwerke. Two months later, together with ten other unvaccinated "controls", they were infected with the rickettsia cultures from the Robert Koch Institute. By the end of the trials, three untreated and two treated victims had died. At an evaluation meeting held at the Behringwerke in May 1942, the Robert Koch Institute's Cox vaccine was certified as having the best protective effect, and I.G. Farben had to modify its own procedure accordingly by the spring of 1943.

However, following these decisions, there was still no authority that could have enforced a uniform approach to the production of the mass vaccine. The rivalry between the research groups escalated even further, and even the Behringwerke and their Lviv research and production center began to produce Weigl vaccines in addition to the egg vaccines. In Marburg, 50 forced laborers and in Lviv over 1,000 Soviet prisoners of war and Jewish ghetto residents were forced to "feed lice". In the Buchenwald concentration camp, too, at least

eight further series of experiments were carried out, in which the modified vaccines from the Lemberg Behring Institute were also tested several times. Mrugowsky and Ding adopted a particularly cruel procedure: As they considered the presence of infected lice strains in the concentration camp to be too risky, they infected five to ten prisoners with the various rickettsial cultures every month in parallel to the test series in order to treat them as "passage persons" like infected lice: At the peak of the infection, they took portions of the highly virulent rickettsial strains from them through blood samples and transferred them to the test victims through intravenous injections. The numbers of test victims and "passage persons" can no longer be reconstructed exactly today. What is certain, however, is that at least 500 prisoners were abused in at least nine series of experiments; of them
127 died, while most of the at least 120 "passage people" perished in agony as a result of their artificial infection with the highly virulent rickettsial strains.

While the managers of the Behringwerke department of I.G. Farben engaged in a murderous race with the other top authorities in German epidemic research to find the most efficient vaccine for the Buchenwald vaccination experiments, they held a monopoly position in the field of drug treatment of typhus.[110] Despite Menk's negative treatment results, they expanded the system of contract physicians and had their chemotherapeutic substances, including sulfonamides, tested on all newly emerging epidemic foci. Wohlrab treated hundreds of Warsaw hospital patients in 1941. Menk repeated his Warsaw experiments on the Soviet forced laborers in a hospital ward for foreigners that he headed, and the head of the Hamburg Tropical Institute, Peter Mühlens, tried in vain to control a typhus epidemic raging in the Neuengamme concentration camp at the turn of the year 1941/42 with the help of I.G. Bayer's sulfonamide series. In addition, there were therapeutic mass experiments in Soviet prisoner-of-war camps in which military doctors of all ranks took part. The

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110 SfS Archive, I.G. Farben trial, ADB 85 and 86; Lindner: Hoechst, p. 372ff.; Klee: Auschwitz, die NS-Medizin und ihre Opfer, p. 295ff.; Werther: Menschenversuche, p. 160ff.

The result was and remained clearly negative. In November 1942, it was recorded at the Second Eastern Workshop of the Wehrmacht's Consultant Specialists that all attempts at chemotherapeutic treatment had failed.

However, the research and testing departments of the pharmaceutical division of I.G. Farben did not let up. They insisted on favorable animal test results for some preparations, most of which had already been synthesized in the 1930s and had fallen behind the more specific sulfonamides. The Hoechst group favored a nitroacridine preparation "3582" and its arsenic acid salt known as "Rutenol", and the pharmacists at Bayer advocated methylene blue and an acridine preparation "B 1034". From the fall of 1942, they used this palette to address their contract doctors and contract partners in the concentration camps. Under the direction of the Hygiene Institute of the Waffen-SS and the supervision of Reichsarzt-SS Ernst Grawitz (1899-1945), Hellmuth Vetter in the Auschwitz and Monowitz concentration camps and Erwin Ding in Buchenwald launched new experimental series in which the test victims were artificially infected as in the previous vaccination experiments. Obviously, the "standardization" of the experimental procedures was intended to improve the results. This is also supported by the fact that additional drugs were used to treat specific side effects, such as the blood substitute Periston to prevent circulatory collapse. But this did not work out either. Ding and Vetter were unable to demonstrate any positive treatment effects - apart from the evidence that Periston temporarily stabilized the circulation. Instead, they had to state in their test reports that the side effects, especially severe vomiting and diarrhea as well as the occurrence of jaundice as a result of acute liver damage, further aggravated the artificially induced course of the disease. The formal "professionalization" of the experiments, which the concentration camp doctors agreed in joint meetings with their clients in Höchst and Leverkusen, did nothing to change this fact. The terrible experiments, to which most of the "passage persons" and over half of the experimental victims of the epidemic areas in the concentration camps Auschwitz, Monowitz ("Buna IV"), Buchenwald and Mauthausen-Gusen were continued until the end of July 1944.[111]

The pharmacologists and epidemic experts at I.G. Farben not only acted as clients of the concentration camp doctors and the Hygiene Institute of the Waffen SS, but also actively influenced the modalities, procedures and consequences of the experiments. They met with Mrugowsky and the concentration camp doctors at regular meetings, where they coordinated the series of experiments.[112] They also corresponded with them at length and studied and commented on their reports. As experts in microbiology, including Ludwik Fleck, who had been imprisoned himself, assessed after the war, this connivance, which made the clients from Hoechst, Leverkusen and Marburg accomplices, was beyond doubt.[113] It was clear from their correspondence that they were working on the basis of fixed test durations, which did not exist for epidemiological studies on groups of patients, and which therefore presupposed the deliberate infection of healthy test victims. Added to this was the fact that the vaccination and treatment trials were not only reported on at specialist conferences, but that Ding and Vetter also published about their experiments. These publications alone made it clear that they were involuntary test victims who had previously been artificially infected. In view of this astonishing openness to the broader specialist public and the largely lacking camouflage in the internal correspondence, we must assume that the clients and contractors of the concentration camp experiment series in the field of typhus research discussed the modalities of the experiments and their consequences for the victims in detail during their meetings. Despite this, they were acquitted in the I.G. Farben trial for lack of evidence spoken.[114] The prosecution had only presented documents proving their complicity up to the summer of 1943.[115] The defendants and some exonerating witnesses from the pharmaceutical-serological departments of I.G. Farben took advantage of this gap and claimed in coordinated statements that they had broken off contact with the SS doctors as soon as they had become aware of the ethical and professional reprehensibility of their experiments.

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[111] Cf. the correspondence between Vetter and the pharmaceutical departments of I.G. Hoechst and I.G. Leverkusen in 1943/44 in: SfS Archive, I.G. Farben Trial, ADB 88. The microfilmed document templates for ADB 84 to 88 of the I.G. Farben Trial can be found in their entirety in: NARA II, T-83, roll 83-87, Cf. also the statements of the former inmate doctors Wladyslaw Tondos, and Stanislaw Klodzinski as well as the former Monowitz inmate Leon Staischak about typhus experiments in the Auschwitz main camp and in Monowitz: SfS Archive, I.G. Farben Trial, ADB 88, Doc. NI-12452, NI-11680 and NI-19928.

[112] The meetings between the pharmacists and serologists from I.G. Hoechst and I.G. Behringwerke (Lautenschläger, Demitz, Bockmühl and Weber) with the head of the Hygiene Institute of the Waffen-SS are documented in: SfS Archive, I.G. Farben Trial, ADB 85.

[113] Ludwik Fleck, affidavits, 12.2.1948 and 13.2.1948, NI-15043 and NI-15252. SfS Archive, I.G. Farben Trial, ADB 94. Joint statement by Graham Selby Wilson and Arnold Ashby Miles, 15.4.1948, NI-15241. SfS Archive, I.G. Farben Trial, ADB 94.

After the failure of the "Blitzkrieg" stage, the pharmaceutical departments of I.G. Farben intensified their cooperation with the concentration camp doctors. In November 1941, Hellmuth Vetter was transferred from Dachau to the Auschwitz concentration camp. There he became camp doctor in the epidemic block (Block 20) of the main camp and initially completed a series of experiments begun in Dachau concentration camp, in which he compared the efficacy and tolerability of the Bayer sulphonamide sulphapyridine with the properties of a better tolerated Swiss competitor preparation on prisoners suffering from pneumonia.[116] He then extended the activities he had agreed with the Hoechst and Elberfeld clients to the epidemic wards of the Birkenau (Auschwitz II) and Monowitz (Auschwitz III) camps, making use of the expertise of several inmate doctors and involving his fellow SS doctors Friedrich Entress (1914-1947) and Eduard Wirths (1909-1945) in the contractual relationship with I.G. Farben. Like Erwin Ding in Buchenwald, he infected the prisoners selected for the experiments artificially with rickettsia cultures grown on chicken embryos, and later by transferring fresh blood from "passage persons". However, he not only used these people as a reservoir for his chemotherapeutic treatment experiments, but also treated them with the Behringwerke vaccines, which further exacerbated the clinical pictures.

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[114] See Karl Heinz Roth: Case VI. The Nuremberg Trial against I.G. Farben. Fritz Bauer Institute / Goethe University Frankfurt am Main: Norbert Wollheim Memorial 2008, http://www.wollheim-memorial.de/files/990/original/pdf_Karl_Heinz_Roth_CaseVI._Der_Nuernberger_Prozess_gegen_IG_Farben.pdf.

[115] The follow-up documents from June to July 1944 can be found in: NARA II, T-83, roll 87, frame 3459865 ff.

[116] On this and the following, see SfS Archive, I.G. Farben Trial, ADB 86 and 87; Jan Mikulski: Pharmacological Experiments in the Auschwitz-Birkenau Concentration Camp. In: *Hefte von Auschwitz* 10 (1967), pp. 3-18; Klee: Auschwitz, die NS-Medizin und ihre Opfer, pp. 294ff., 418ff., 433ff.

At the same time, together with Entress and Wirths, he started large-scale test series to test the non-specific chemotherapeutic agents from Hoechst (preparation 3582 and Rutenol) and Bayer (B 1034 and methylene blue) on the previously infected test victims, but also to analyze their intolerance effects on healthy inmates. Later, smaller test series were added in which the side effects were also treated with additional medications from I.G. Farben, such as the circulatory support agent Periston.[117] Vetter and his colleagues also varied the dosage forms of the preparations as tablets, granules, enemas and the various injection forms. In line with the non-specific chemotherapeutic nature of the substances tested, he also undertook treatment trials to combat phlegmons, erysipelas and tuberculosis. The experimental terrain expanded once again, and in addition to the clients in El- berfeld and Höchst, the Reichsarzt-SS Grawitz was also kept up to date with test reports.

At least 350 prisoners were subjected to these tortures, and in some series of experiments more than half of them died. Others suffered severe permanent damage and were sent to the gas chamber. Among those who died and were killed were also prisoners from the Buna/Monowitz concentration camp, who had been admitted to the infirmary of the Buna concentration camp or transported back to the main camp after the last remnants of their working capacity had been exploited. In this way, a two-phase process of pharmacological-chemical extermination followed the exploitation cycle of some of the labor slaves of the Auschwitz-Monowitz construction project: Before they fell victim to the "dual" de- lousing agent Zyklon B, they were first subjected to the tortures of the typhus experiments or degraded to "passage persons".

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[117] The Periston experiments began in Auschwitz and Monowitz in the fall of 1942 and were continued by Vetter in Mauthausen-Gusen in 1943/44. Cf. the correspondence between Vetter and the pharmaceutical department of I.G. Leverkusen in: SfS Archive, I.G. Farben Process, ADB 87 and 88.

From strategic defense to defeat

At the turn of the year 1942/43, the military expansion of the German sphere of control beyond Europe came to a standstill. The Anglo-American expeditionary corps that had landed in North Africa began to drive the armored armies of the fascist "Axis" out of the Maghreb, and the encirclement and destruction of the 6th Army before Stalingrad finally blocked access to the Caucasus crossings to the Central Asian and Middle Eastern oil sources. German warfare was now finally on the strategic defensive, but this was by no means an anticipation of defeat. The outcome of the war was still completely open at this time.[118] In the months that followed, the German Reich succeeded in increasing its armaments potential to an extraordinary degree, systematically plundering the occupied territories of Eastern and South-Eastern Europe, subjugating the continent's manpower potential and integrating the economic resources of Western and Northern Europe into an armaments cooperation that served the collaborating elites as a "European bulwark" against the threat of Soviet-American world hegemony. The increase in German military and armaments potential, which lasted well into 1944, made it clear that the slogan of "Fortress Europe" had an undeniable material basis. Even when this "fortress" threatened to falter for the first time in the summer of 1943 after Italy's withdrawal from the war and the failure of the German offensive at Kursk, the command staffs of the Wehrmacht, SS and armaments planning responded with a further operational, structural and material radicalization of their warfare, which took "total war" to completely new dimensions.[119]

As one of the pillars of the armaments industry, I.G. Farben played a decisive role in this development. Its factory complexes and plants were eventually became objects of warfare themselves.[120] Apart from a few attacks by the British Royal Air Force and the Soviet Air Force during the first years of the war, which had almost no consequences, the I.G. managers experienced this for the first time in February 1943, when a commando of the British Special Forces SOE blew up the Norsk Hydro heavy water plant in Vermork. This was followed in July, September, November and December 1943 by the first strategic attacks by the bomber fleets of the three Allied powers on the I.G. plant in Auschwitz, the now merged Ludwigshafen and Oppau plant complex, the Buna plant of Chemi- sche Werke Hüls and the Nordisk Lettmetall plant under construction in Herøen. Some of the damage was considerable, but with the exception of Vermork and Herøen, it was quickly repaired. It turned out that the plant management and plant communities had not been preparing for passive and active air protection of their plants since 1935 for nothing. In the German and East Upper Silesian plants, "damage columns" went into action, whose special forces were able to draw on extensive stocks in the repair and maintenance departments and deploy thousands of forced laborers to clear the rubble as required. The damaged factory complexes were restored at record speed and the construction and operation of the plants continued.

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[118] Richard Overy: *The roots of victory. Why the Allies won the Second World War.* Stuttgart: DVA 2000, p. 11ff., 418ff.

[119] Military History Research Office (ed.): *The German Reich and the Second World War. Vol. 5: Organization and mobilization of the German sphere of power. Second half-volume: War administration, economy and human resources 1942-1944/45.* Stuttgart: DVA 1999; Dietrich Eichholtz: *History of the German war economy 1939-1945. Vol. III: 1943-1945.* Berlin: Akademie 1996.

Nevertheless, even during this phase of strategic defense, it became clear that there was a lot at stake for I.G. Farben. The mammoth Auschwitz project had been wrongly considered "air war-proof", and since the Soviet and American air raids in July and early December 1943, a race began between the construction management and the Allied attackers to complete the plant, with methanol synthesis starting up in the fall of 1943 and a carbonization plant and a carbide furnace beginning operation the following spring. Even more drastic were the events at the northern periphery of the I.G. empire.[121] The 8th Fleet of the U.S. Army Air Force attacked Herøen in July and destroyed the Nordisk Lettmetall plant, which was nearing completion, as well as the associated power plant under construction in Mår and the neighboring Norsk Hydro nitrogen plant. This was the hardest blow that the managers of I.G. Farben had ever had to parry.

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[120] Cf. the following United States Strategic Bombing Survey: *Oil Division. Final Report.* 2nd ed. Washington, DC: G.P.O. 1947; United States Strategic Bombing Survey: *Overall report, European war. Washington*, DC: G.P.O. 1945; Plumpe: I.G. Farbenindustrie AG, p. 293ff., 385f.; Gottfried Plumpe: Industrie, technischer Fortschritt und Staat. The rubber synthesis. In: *History and Society. Journal for Historical Social Science* 9 (1983), H. 4, pp. 564-597, here pp. 592ff.; Stokes: Von der I.G. Farbenindustrie AG, pp. 318ff.

But now it became clear that and why the managers and executives of I.G. Farben had advanced to the inner circle of the German armaments management. When the Reich Minister for Armaments and War Production Albert Speer decided at the beginning of August 1943, following an agreement with the Reich Commissioner for Occupied Norway Josef Terboven, to have only Norsk Hydro's nitrogen plant rebuilt in Herøen, I.G. manager Heinrich Oster, who was responsible for the light metals division, lodged an energetic protest. The entire I.G. management then mobilized to save their Scandinavian prestige project. It made its Oslo construction team available to Norsk Hydro, intensified its efforts to finance the Herøen project through the Wallenberg brothers' Stockholms Enskilda Bank and, at the end of October, expressly stated that A/S Nordisk Lettmetall would continue to exist and prepare for the start of reconstruction work. With so much vigor and persistence, Reich Commissioner Terboven also saw reason and agreed to Ilgner and Oster's proposal to coordinate the chemical interests of his statutory authority with those of I.G. Farben. On December 1, 1943, the Oslo construction staff and the former North Liaison Office of GBChem were combined to form the "North Liaison Office". Under the leadership of I.G. Farben manager Wilhelm von der Bey, the Chemical Trust was now responsible for controlling the entire Norwegian nitrogen and light metal production as well as the extraction of sulphur gravel and metal ore. This led to the formation of a revealing front between I.G. Farben, which was struggling for its European post-war prospects, and the Allies. While the collaborating Scandinavian high finance forced the Norwegian government-in-exile to tolerate the alliance between Norsk Hydro and I.G. Farben, thereby working in favor of the German chemical trust, the 8th Fleet of the U.S. Navy continued to work with the Allies.

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[121] On this and the following sections SfS-Archiv, I.G. Farben-Prozess, ADB 30; Petrick: "Light metal construction Norway", p. 156ff., 173ff., 183ff.

Army Air Force continued its attacks against the material bases of collaboration. It continued to attack the Norsk Hydro plant complexes and in November 1943 also destroyed the power station that supplied the now rebuilt heavy water plant in Vermork with energy.

This episode was not a special case. Many other factors and events prove that the management bodies of the armaments divisions were serious about the concept of armaments integration in "Fortress Europe".[122] They supplied more and more companies in neutral and collaborating foreign countries with their basic products, for example exporting 23.7 percent of their total Buna production in 1943 and 18.1 percent even in 1944. The Ludwigshafen construction department supervised the completion of a methanol plant, a formaldehyde plant and two nitrogen plants in Franco Spain until the end of 1944 in order to keep the revolving door to Latin America open on the basis of the projects it had designed. The cooperation with the French chemical industry also bore fruit despite the increasing threat from the Resistance until the Allied invasion: it not only supplied important organic intermediate products and machines for the "Ostwerke", but also joined the circle of Zyklon B manufacturers.[123] While the factory managements and factory communities exploited the compulsory labor laws enacted by the collaborationist governments from the spring of 1943 for the unscrupulous hunt for workers, they followed a carefully thought-out code of conduct in their dealings with the Western and Northern European economic elites, which strictly respected their role as partners in European armaments integration. However, if the collaboration partners left this common framework, such considerations disappeared almost overnight. This became drastically apparent when Fritz ter Meer, as plenipotentiary of the German government, brought the chemical industry of central and northern Italy under his control after the Italian declaration of war on September 8, 1943.

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[122] Plumpe: Industrie, technischer Fortschritt und Staat, p. 596f.; Stokes: Von der I.G. Farbenin- dustrie AG, p. 301f.

[123] Arne Radtke-Delacor: Produire pour le Reich. Les commandes allemandes à l'industrie française (1940-1944). In: *Vingtième siècle. Revue d'histoire* 70 (2001), H. 2, pp. 99-115; Annie Lacroix-Riz: *Industriels et banquiers français sous l'Occupation. La collaboration économique avec le Reich et Vichy.* Paris: Colin 1999, pp. 163f., 205ff., 275ff., 294ff., 349ff.

However, all these constellations were overshadowed by an event that heralded the failure of the strategic defensive. On May 12, 1944, the

8th and 15th Fleets of the U.S. Army Air Force launched a strategic air offensive against the hydrogenation plants, which was joined by the Royal Air Force on June 12.[124] On

On May 12, almost 1,000 bombers attacked the central German hydrogenation plants in Leuna, Lützkendorf, Böhlen, Zeitz and Brüx, hitting them hard. On May 28/29, another wave of attacks followed, which not only destroyed the repair work that had been started, but also affected the other Central German plants - including the hydrogenation plant in Pölitz, in whose operating company Standard Oil of New Jersey had a stake. The Royal Air Force attacks on the Ruhr followed in June, and until April 1945 the air fleets of the Western Allies took turns in their coordinated day and night raids on the synthesis plants in the Rhine-Ruhr area, central Germany and eastern Upper Silesia. The consequences were devastating for the supply of the Wehrmacht, especially as the air offensive had already been preceded by attacks on the Romanian oil refineries from March 1944. By the late summer of 1944, the fuel supply had been halved, and in September, aviation fuel production fell to just under a tenth of the level of March of the same year. Due to their close technological and manufacturing links, the nitrogen supply also collapsed, and the explosives sector was also decisively affected. In contrast, the effects on the Buna area were less dramatic. Although the Buna III plant in Ludwigshafen had to be effectively shut down in October 1944, the main plants in Schkopau and Hüls were spared, and the managers at Hüls were able to maintain production by compensating for the loss of hydrogenation waste gases supplied by the synthesis plants in the Ruhr region by accessing the natural gas reserves in Münsterland.

In fact, the Allies' air war strategists hit a critical point in the German war potential with the hydrogenation plants.[125] When the propellant and lubricants failed, the main weapons of motorized warfare - aircraft, tanks and submarines - became immobile. Since 1941/42, the Allies had adopted the operational "innovations" of German warfare and had become an equal military opponent. In addition, since 1942 they had had sole control of strategic bomber fleets, which they now used to immobilize the Wehrmacht. Their goal was air supremacy over Europe and the paralysis of the German armored armies, as this was the indispensable prerequisite for the Anglo-American invasion in the west and the parallel strategic breakthrough of the Red Army in the area of Army Group Center.

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[124] Birkenfeld: Der synthetische Treibstoff, pp. 183ff., 189ff., 206ff.; Olaf Groehler: *Bombenkrieg gegen Deutschland.* Berlin: Akademie 1990, p. 210ff.; Eichholtz: Geschichte der deutschen Kriegswirtschaft, vol. III, p. 32ff.

[125] See Eichholtz: Geschichte der deutschen Kriegswirtschaft, vol. III, p. 32ff. on the strategic importance of the hydrogenation plants for the German war effort.

These connections were not only known to the leadership committees of the Nazi dictatorship, but also to the top managers of I.G. Farben and GBChem. Since the Upper Rhine Group, unlike the aircraft industry, had rejected the idea of relocating or bunkering its synthesis plants underground at the beginning of February 1944 due to the risk of explosion caused by the high pressures and temperatures and had instead agreed to maintain production despite the bombing,[126] the repair capacities now had to be given top priority. Immediately after the first wave of attacks, Bütefisch set up a "reconstruction team". The GBChem set up a task force headed by Gerhard Ritter. The Buildings Office of the Ministry of Armaments also put together a "special staff for hydrogenation works". After the second devastating wave of attacks on 28/29 May, these activities were given a central steering body in the form of the so-called Geilenberg Staff, which was endowed with dictatorial powers and was able to procure the manpower, building materials, transport facilities and steel contingents required for the reconstruction work at the highest priority level. In the late summer of 1944, the Geilenberg staff comprised 350,000 workers. As the Allied bomber fleets attacked the repaired hydrogenation plants again and again, bitter collisions arose with the other priority suppliers, in particular the company responsible for the

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126 Management meeting in Ludwigshafen, 2.2.1944. BASF UA, C 13 (Management meetings 1940- 1945), ref. after Stokes: Von der I.G. Farbenindustrie AG, p. 316 and p. 684 note 239; on the technological problem of relocating the hydrogenation plants underground, see Birkenfeld: Der synthetische Treibstoff, p. 198ff.

The "Jägerstab" responsible for the aircraft industry. It was a grotesque race that was increasingly fought on the backs of forced laborers and concentration camp prisoners. But the immobilization of the once highly mobile German troops was unstoppable. The Allies gained air supremacy in the summer of 1944 and destroyed the German air force. Less than a month after the Western Allies landed in Normandy, fuel allocations to the Western Front had to be cut for the first time. The advance of a tank army against the Red Army's Vistula bridgehead had to be aborted due to a lack of fuel, and for the same reason the last German counter-offensive in the west (Ardennes Offensive) came to a standstill in December. The military defeat and the occupation of the Reich territory by the Allies could no longer be stopped.

The plants and plant communities were affected very differently by these dramatic events: The destruction was greatest where hydrogenation and isooctane plants were integrated into the factory complexes.[127] In Leuna and Ludwigshafen-Oppau they were therefore the worst, at 70 and 45 percent respectively, and there was a repeated sequence of decommissioning, reconstruction and renewed destruction, whereby in the case of Ludwigshafen and Oppau two explosion disasters, which were obviously not caused by the air war, exacerbated the disaster. In Auschwitz and Heydebreck, on the other hand, the air war prevented the commissioning of the entire facilities, although the central facilities of the Auschwitz I.G. plant - gasworks, power plant, waterworks, smouldering plant and carbide furnaces - were not significantly damaged by the last air raids at the end of December 1944. The Bitterfeld-Wolfen light metal center remained largely unharmed; it only had to reduce its capacities due to transport shortages and constantly sent columns of workers to the damaged areas in Leuna, the other central German hydrogenation plants and in eastern Upper Silesia. The Mittelrhein (Hoechst) and Niederrhein (Leverkusen, Elberfeld and Dormagen) joint ventures were also able to maintain their air war damage within limits. On average, only around 15 percent of I.G. Farben's plant assets were destroyed by the Allies' strategic air warfare.[128]

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[127] United States Strategic Bombing Survey (USSBS): Oil Division. Final Report; USSBS, Oil Division: *Ludwigshafen-Oppau Works of I.G. Farbenindustrie AG.* 2nd ed., 1947; USSBS, Aircraft Division: *Light Metals Industry of Germany. Part I, Aluminum. Part II, Magnesium.* 2nd ed., 1947; USSBS, Oil Division: *Ammoniakwerk Merseburg GmbH, Leuna, Germany.* 2nd ed., 1947; Hackenholz: Die elektrochemischen Werke, p. 322ff.; Stokes: Von der I.G. Farbenin- dustrie AG, p. 318ff.

Thus, the leading technicians and businessmen at I.G. Farben headed for defeat rather inflexibly. Compared to other large companies, which developed a differentiated survival scenario for the expected insularity of their companies in the future Allied occupation zones in coordination with the post-war planning group of the Reichsgruppe Industrie, this is quite striking. However, it is also not particularly surprising, as the Che- mie-Trust was integrated into the personnel, institutional and technological-manufacturing structures of the German armaments potential like no other German company. The top management was unable to escape these shackles, especially as its CEO Hermann Schmitz did not have the charisma of his predecessor Bosch, while the Chairman of the Supervisory Board Krauch, as the most important executor of Bosch's technocratic legacy, was too involved in sovereign functions to be able to initiate a secretive change of course. Only the savings managers used their remaining room for maneuver to coordinate the relocation of the most valuable assemblies, operating documents and the documents of the "Ostwerke", to set up collection and processing centers and to bring the "substance-important" blueprints of their development projects to safety. However, neither they nor Vermittlungsstelle W succeeded in bringing order to the chaos of the agony phase. As the fronts in the west and east approached the main plants in February/March 1945, the last attempts to relocate development lines declared to be particularly "important to the war effort" to central Germany were halted.

In contrast, the joint ventures and the parent plants of the
I.G. Farben made independent preparations for the imminent end of the war, as it seemed increasingly likely that the top management would be out of action for at least a while. Accordingly, the importance of clear management competencies in the main plants grew, and now the era of regional management began.

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[128] In addition to the case studies of the United States Strategic Bombing Survey cited in note 109, see Plumpe's overview of the war damage suffered by I.G. Farben:

fourth-generation executives who had made a name for themselves during the war years. In some cases, the power they had achieved in the meantime only needed to be confirmed, as they had already been on the board for some time, such as Heinrich Bütefisch (Leuna), Ernst Bürgin (Bitterfeld) and Carl Wurster (Ludwigshafen-Oppau). From time to time, the plant managers also co-opted young assistants who could replace them in the event of a temporary suspension, such as in Ludwigshafen-Oppau, where a private assistant of Carl Bosch's named Bernhard Timm (1909-1992), who moved to the ammonia laboratory in 1936, made a name for himself as Wurster's interpreter and personal secretary.[129] Sometimes the Board of Directors also deliberately refrained from formally co-opting particularly capable junior staff so that they could take on management tasks in the event of sanctions against the top management of the company. This was clearly the case with Ulrich Haberland (1900- 1961), who had headed the Leverkusen plant and the Niederrhein Group since 1943. Karl Winnacker (1903-1989), who had been Director of the Inorganics and Chemicals Department at Hoechst since 1943, was also designated as the successor to plant manager Lautenschläger, but was not, as was usual in such cases, appointed as a deputy member of the Central Executive Board. The two were not to disappoint the expectations placed in them.

In the final months of the war, Haberland and the other senior junior managers in particular ensured that the immobility of the Group as a whole was broken up to some extent. Bypassing the Group management, they adopted the survival tactics of the other large companies. They reacted to the civilian research and development capacities maintained in the shadow of the armaments economy. Like the managers of the other armaments companies, they dismissed the conscripted women in the last weeks of the war, released the forced laborers to work in the entrenchments and had the satellite concentration camp detachments transported back to the main camps in order to cover up the traces of the operational terror. Immediately before the occupation by the Allied troops, they kept the remaining core workforce together with repair and maintenance work and endeavored - not always to the best of their ability - to keep the factory running.

I.G. Farbenindustrie AG, p. 606ff.

successful - that the factory complexes were kept out of the final battles.[130]
In addition, some junior managers also pondered the question of the extent to which the transition to the post-war period could be used as an opportunity to either transform the now unmanageable "colossus" I.G. Farben into a holding company, under whose umbrella the once again enormously expanded joint ventures would regain greater freedom of action, or to establish the joint ventures as independent stock corporations.[131] August von Knieriem, head lawyer and member of the Board of Management, took a slightly different approach.[132] In a paper written around the turn of the year 1944/45, he asked himself whether the chemical trust had now exceeded its optimal size and was so bureaucratized and centralized that the managers responsible for the production lines lacked the scope for decision-making and action to optimize operational performance. In contrast, the advantages, in particular the financial flexibility, the ability to achieve economies of scale and the enormous financial strength to overcome even major crises, were less important. Knieriem therefore advocated unbundling, but not in the sense of making the operating communities independent, but rather in accordance with the business logic of those large development and production lines that had emerged since the divisions were founded. However, Knieriem also felt that such an approach was necessary because the Allies would definitely put the unbundling of I.G. Farben on the agenda. In this context, Knieriem explicitly referred to the US anti-trust legislation. He obviously expected the USA to provide the main impetus for divestment after the war. He had good reason to do so, because as head of the

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129 Bernhard Timm had studied in Heidelberg and had become an assistant at Bosch's private observatory after completing his physics dissertation in 1934.

130 Cf. the coverage of the most important I.G. plants in the last days of the war: Stokes: Von der I.G. Farbenindustrie AG, p. 331ff.; Lindner: Hoechst, p. 349ff.; Stefanski: Zwangsar- beit in Leverkusen, p. 375ff.; Hackenholz: Die elektrochemischen Werke, p. 343ff.; Janis Schmelzer / Eberhard Stein: *Geschichte des VEB Filmfabrik Wolfen*. Berlin (East): Tribüne 1969, p. 98ff.

131 Carl Wurster: Die Neugründung der BASF im Zuge der I.G.-Entflechtung und die Entwicklung der BASF 1945-1954, July 15, 1954, pp. 6f. BASF UA, ref. after Stokes: Von der I.G. Farbenindustrie AG, p. 685 note 275.

As head of I.G. Farben's legal department, he had witnessed in detail the actions of the US federal authorities against General Aniline & Film Corporation and the other US branches of I.G. Farben since the spring of 1942. His proposal therefore amounted to using an expected initiative by the American decartelization authorities for a reorganization measure that had become necessary anyway.

However, as far as we know at the time, there was no central planning group or coordinating authority behind these preparatory measures and considerations. The Chemical Trust remained true to its role as the armaments backbone of the German war effort until the occupation by Allied troops. It was like a boxer who was no longer able to get out of the ring after his technical knockout.

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132 August von Knieriem: Division of I.G., undated (end of 1944). BASF IG, A 281/1, ref. after Stokes: Von der I.G. Farbenindustrie AG, p. 332 and p. 685 note 275.